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in Europe



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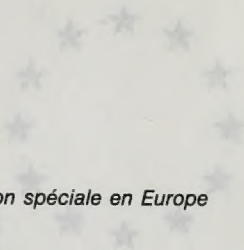
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Invertebrates in need of special protection in Europe

by N. Mark Collins and Susan M. Wells
(IUCN Conservation Monitoring Centre)

European Committee for the Conservation
of nature and natural resources

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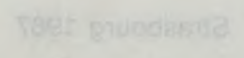
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PREFACE

This report was originally called "Insects and other invertebrates as candidates for the Bern Convention" and was presented to the Committee of Experts for the Conservation of Wildlife and Natural Habitats in November 1986. In December 1986, the Standing Committee for the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) adopted it as the basis for additions to the appendices of the Convention.

It was not originally intended to publish the report in the Nature and Environment series, but once the decision to do so was taken, the title appeared inappropriate for two reasons: firstly, it was hoped that invertebrates would not always be considered as candidates for the Bern Convention, but would form an important part of the wildlife which the Convention protects. Secondly, the proposed list might be amended to some degree. The new title therefore appeared more suitable even if, for obvious reasons, it is impossible to list all the invertebrates which are in need of special protection.

The list should be considered as provisional, because some information is certainly still lacking, but it is hoped that the report will nevertheless be of interest to entomologists and ecologists as it stands.

It is to be hoped that the inclusion of invertebrates in the Bern Convention will prove an important advance towards their protection in Europe.

1. CONTEXT

The work programme of the Council of Europe is implemented by 15 permanent Steering Committees, one of which is the European Committee for the Conservation of Nature and Natural Resources (known as CDSN). Work encouraged by CDSN on invertebrate conservation has proceeded along three fronts:

- 1) Publications. The Council of Europe contracted a report on "Threatened Rhopalocera (butterflies) in Europe" (Heath, 1981b), published as Number 23 in COE's Nature and Environment Series. A further report on dragonflies is to be published soon (van Tol and Verdonk, in prep.). Edition number 49 of Naturopa (1985) was devoted entirely to the subject of insects, their conservation and protection in Europe.
- 2) Group of Consultants in Invertebrates. CDSN has four Expert Committees, through which the CDSN work programme is largely implemented. One of these is the Committee of Experts for the Conservation of Wildlife and Natural Habitats (SN-VS). This Committee has a number of Groups of Consultants, including one for invertebrates. The terms of reference of the Invertebrate Group were defined in March 1983, since which time group activities have concentrated on a) a general declaration (charter) on terrestrial invertebrates; b) a consideration of the status of dragonflies; and c) a consideration of the status of insects dependent upon dead-wood and rotten-wood habitats.
- 3) Proposals for additions to the Bern Convention. The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) entered into force on 1 June 1982. The Convention has been signed by Austria, Belgium, Cyprus, Denmark, Federal Republic of Germany, Finland, France, Greece, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom and the European Community, and ratified by all except Belgium, Cyprus and France (21 member states in all).

In response to the publication of the Heath (1981b) report on Europe's butterflies, the Committee of Ministers adopted, on 3 June 1982, Recommendation No. R(82)11 inviting the Standing Committee for the Convention to consider adding some butterflies to the Appendices. In particular, to take appropriate steps to ensure proper legislative measures for the protection of threatened butterflies and their habitats (biotopes), to encourage restoration of threatened species to viable populations, to carry out necessary research on the status of butterflies, and to encourage public education on butterflies.

In November 1983 the UK delegation presented to the Bern Convention Secretariat a recommendation to add endangered and vulnerable invertebrates to the appropriate Appendices of the Convention. The Standing Committee responded by inviting CDSN "to attach high priority to its activities for conservation of invertebrates".

In December 1984 the UK delegation submitted data sheets (adapted from the Heath, 1981b, report) for six endangered butterflies to the Standing Committee, with a view to their inclusion on Appendix II of the Convention. In correspondence with Swiss authorities, a seventh butterfly was also submitted for consideration. Regrettably, these submissions were late and could not be formally considered. Nevertheless, the proposal was circulated for a preliminary discussion. The feeling at the 1984 meeting of the Standing Committee was that urgent action to protect endangered invertebrates was a high priority. However, there were doubts a) about the timing of the proposed alterations to the Appendix given that several states were in the process of ratification, and b) about the wisdom of adding a small batch of species, given that extensive legislative action might be required by the Parties. In conclusion it was decided "to invite a consultant to investigate the question of the most endangered insects in Europe, (in order) based upon the.....study, to envisage as soon as possible the inclusion of certain most endangered non-controversial species of invertebrates in the appendices of the Convention" (Report of the 3rd meeting of Parties, 1984).

The IUCN Conservation Monitoring Centre, Cambridge, UK, was invited to take up the consultancy and a report by N.M. Collins covering insects only was presented in November 1985.

At the December 4th 1985 meeting of the Standing Committee the report was circulated, but not considered in detail. The UK delegation again requested consideration of the six butterflies tabled by that country in 1984, this time as a formal proposal. The Secretariat held the view that the proposal had not been properly presented and it was withdrawn.

In early 1986, the Secretariat requested further data from CMC, notably on threatened invertebrates other than insects, and on a broader range of insects than appeared in the first Collins report. The present paper is presented in fulfillment of that request. Since virtually all the data in the first report remain relevant, the author has decided to enlarge that report to suit the new requirements, rather than present a second report that would have to be considered in addition to the first.

This report therefore supercedes the report "Insects as candidates for the Bern Convention" by N.M. Collins, which should no longer be used.

2. INTRODUCTION TO INVERTEBRATE CONSERVATION

Invertebrates are conservatively estimated to comprise three quarters of all living species. The importance of invertebrates in ecological processes and as a living resource of benefit to humans should not be under-estimated: they are major components of food chains, are of primary importance in the cycling of nutrients and they play a significant role in the maintenance of soil structure and fertility. Insects are vital pollinators of many plants, including economically important species. Many invertebrates are predators, parasitoids and parasites of pest species, and exert a natural control which has often been overlooked in the past. In some cases these inter-relationships can be harnessed for use in biological control programmes. In Europe a number of wild invertebrates, such as snails and crayfish, are harvested for food, while others are taken for their products, e.g. the Pearl Mussel and Medicinal Leech.

Because of their often small size, cryptic habits and sheer numbers of species, the invertebrates have been neglected by the mainstream of the conservation movement. This situation is now changing. The volume of evidence of threatened invertebrate species has become too overwhelming for governments and conservation authorities to ignore what the specialists have been telling them for over a decade. Thousands of invertebrate species are now threatened, many hundreds of them very seriously indeed. Local and national extinctions have affected every European country and although whole species extinctions are thankfully few, the loss of biological diversity in the European landscape is acknowledged everywhere. The evidence is spread across every page of this report. The overwhelming threat is loss of habitat, either through pollution, degradation or outright destruction.

Protection and appropriate management of habitats are the mainstay of conservation programmes, but to try to do these things without regard to the species living in those habitats is impossible. The aims of species and habitat protection, far from being mutually exclusive philosophies, as they are sometimes portrayed, are mutually reinforcing requirements of any well-balanced conservation effort. It is not safe to assume that protection of a site will ensure the future of its invertebrates. Many invertebrate animals are very sensitive, with strict ecological needs. Small changes in water levels, exposure to insolation, removal of dead wood and a host of sometimes hardly noticeable changes can lead to loss of species of invertebrates. This is in contrast to many birds and other vertebrates, which may be tolerant of widely varying conditions.

The Bern Convention, with its specific provisions to protect the species in its Appendices, as well as to conserve the habitats of these species, is a milestone in European conservation legislation. It has the potential to further invertebrate conservation quickly and effectively. For invertebrates the problem is to choose species for listing. They can only be representatives, for to list all Europe's seriously threatened invertebrates would be a huge task. The list must be a blend of threatened species that are reasonably recognisable, spread across the whole of Europe, and capable of specific measures to conserve them whilst encouraging broader measures in threatened biotopes and ecosystems.

The species list presented here will benefit from wide discussion and input from all European nations.

3. REMEDIAL ACTIONS

3.1. Documentation

Documentation of the state of Europe's invertebrate fauna is the first step in facilitating rational protective measures. Information is generally presented in one of two ways: a) in the form of atlases showing distributions before and after certain dates, or b) in the form of red data books or lists that may or may not be based on cartographic studies.

A number of national atlases of the distribution of selected invertebrate species have been published (e.g. Heath, Pollard and Thomas, 1985; Leclercq *et al.*, 1980; van Tol and van Helsdingen, 1981; Kerney, 1976; see Harding, 1985 and Heath, 1977 for further bibliography). National recording centres often hold records for thousands of insects and other invertebrates. The Biological Records Centre at Monks Wood, UK, holds distributional data on over 10,000 species (Heath, 1973-1979). The Secretariat de la Faune et de la Flore (1983) performs a similar function in France. The European Invertebrate Survey, formed in 1969, seeks to coordinate such national studies in order to prepare European atlases (Heath, 1971, 1973). Twenty-two European countries are represented on the EIS committee. A preliminary set of maps, for 27 species, was published in 1981 (Heath and Leclercq, 1981).

Red data books, lists of threatened species and papers describing threatened species have been produced for many European countries (see Table 1). Several thousand species are considered.

3.2. Legislation

Legislation affecting European insects is the subject of a separate paper prepared for the Council of Europe by Cyril de Klemm (1985). Those countries with legislation on insects and other invertebrates are indicated in Table 1. These efforts have almost invariably aimed towards limiting or prohibiting collecting or commercial exploitation. It has often been assumed that such designation will protect the species concerned, without regard for adequate safeguard of the habitat (biotope), and without further ecological study. This assumption is quite erroneous. Indeed, it is difficult to demonstrate that any insect species has been eliminated by collecting alone (New, 1984; Collins, 1985).

The limitations of such narrow legislation are gradually becoming more generally recognized. Critiques have been published attacking the Dutch laws (Commissie voor Inventarisatie en Natuurbescherming, 1978), the French laws (Bernardi, 1979) and the Polish laws (Palik, 1981). The UK Joint Committee for Conservation of British Insects published a draft resolution on legislation deploring "the mere scheduling of species as endangered ... without the concomitant implementation of any recovery programmes", and stressing "the importance of satisfactory management of sites and recognition of a minimum carrying capacity ('critical habitat') in areas set aside for the conservation of each endangered species" (JCCBI, 1982).

Building on the experiences of national laws and other international conventions, the Bern Convention places its heaviest emphasis on the protection of habitats, especially habitats of species in the Appendices and endangered habitats. Some of its habitat conservation provisions are

general, while others, such as the prohibition of deliberate damage to breeding or resting sites of Appendix II species, are very specific (Lyster, 1985).

3.3. Protective and recovery measures

Following documentation and legislation on threatened insects, protective measures can be applied effectively. It is beyond the remit of this paper to report at length on the degree to which documentation and legislation have resulted in successful conservation measures. Suffice to say that all too often there is a tendency for wildlife laws to be established and never properly implemented. Legislation has at times represented no more than a token gesture, lulling a lay bureaucracy into a false sense of security. There is now a wealth of data on the importance of ecological research, habitat protection and active environmental management in the conservation of insect populations (e.g. Morris, 1981).

Table 1 Red data books, lists and published papers referring to threatened invertebrates in Europe. Existence of legislation pertaining to invertebrates is indicated by + (see separate report to Council of Europe by C. de Klemm, 1985, and Heath, 1981b pp. 15-17).

Country	References	Legislation
International	Heath, 1981; Wells, Pyle and Collins, 1983; Collins and Morris, 1985; van Tol & Verdonk (in prep.)	+
Albania	None known	
Austria	Gepp, 1981 (Steiermark); Gepp, 1983; Gepp, 1985	+
Belgium	Leclercq <u>et al.</u> , 1980	+
Bulgaria	None known	+
Cyprus	None known	
Czechoslovakia	Novak and Spitzer, 1982; a 5-volume Red Data Book is in preparation	+
Denmark	None known	
Finland	Mikkola 1979; Mikkola, 1981; Borg and Malmström, 1975	+
France	D'Ornano and Mehaignerie, 1979; Bernardi, Nguyen and Nguyen, 1981; Real & Testud, 1980	+
Germany (FRG)	Anon., 1982 (Schleswig-Holstein); Anon., 1983 (Bayern); Ant, 1976, Blab and Kudrna, 1982, Blab, Nowak and Trautmann, 1981; Blab, Nowak, Trautmann and Sukopp, 1984; LOLF, 1979 (Nordrhein-Westfalen); Engelhardt, 1954; Itzerott <u>et al.</u> , 1985 (Rheinland-Pfalz); Roesler & Speidel, 1979)	+
Germany (GDR)	Anon., 1979	+
Gibraltar	Cortes, 1978, Anon., 1980	
Greece	None known	+
Hungary	Fazekas, 1983	+
Ireland	None known	
Italy	Tassi, 1969; Tassi, 1972	+
Liechtenstein	Anon., 1933	+
Luxembourg	Anon., 1975; Meyer and Pelles, 1979; 1982	+
Malta	Thake, 1985, Valetta, 1980	
Netherlands	van Tol and van Helsdingen, 1981; Commissie voor Inventaristie en Natuurbescherming, 1978	+
Norway	Kvamme and Hagvar, 1985	
Poland	Dabrowski and Krzywicki, 1982; Palik, 1981; Ferens, 1957; Dabrowski, 1980; Glowacinski <u>et al.</u> , 1980	+
Portugal	Baeta Neves, 1959	
Rumania	Konig, 1981	
Spain	Gomez Bustillo, 1981; De Viedma and Gomez Bustillo, 1976, 1985, Gangwere and De Viedma, 1984	
Sweden	Svensson, 1981	+
Switzerland	Gfeller, 1975; Burckhardt, Gfeller and Müller, 1980; Turner & Wuthrich, 1985	+
Turkey	None known	+
United Kingdom	Foster, 1983; Kerney & Stubbs, 1980; Morris, 1981; Shirt (in press)	+
USSR	Bannikov and Sokolov, 1984; Tanasiychuk, 1981	+
Yugoslavia	Red Data Book reportedly in prep., 1983	

Because the Bern Convention has only recently come into force, the extent to which the Appendix species will be effectively conserved is difficult to assess. According to Lyster (1985), the regular meetings and enthusiasm of the Standing Committee mitigates to ensure enforcement of the Convention. In proposing certain invertebrate species for consideration for the Bern Convention, it has been a prime consideration to ensure that they may feasibly be protected, and that impossible demands are not being made upon either the Standing Committee or the Parties to the Convention. However, it cannot be emphasised too strongly that mere listing on the Bern Convention is not in itself a success. On the contrary, every species listed represents a failure of conservation and signifies the deleterious impact humankind continues to impose on wildlife. Only the preparation and implementation of thorough recovery plans, taking into account the need for habitat protection, management and further research, will lead to the conservation to which the Convention aspires. The time for celebration will come when the threatened species are made safe and can be removed from the Appendices.

4. CRITERIA FOR INVERTEBRATE CANDIDATES

Bearing in mind the preceding discussion of the purpose and implementation of measures to conserve invertebrates, the following criteria have been adopted in preparing a list of candidates for the Bern Convention. The Convention itself does not establish criteria for the inclusion of species in the Appendices, and such criteria have not yet been developed by the Standing Committee.

- 1) The species should be under serious threat (i.e. IUCN categories Endangered and Vulnerable), or of widespread conservation concern.

Rationale: With thousands of species of invertebrates listed as threatened in European Red Data Books, there is the potential to include so many species under the Bern Convention that the overwhelming burden on the Parties would result in no more than frustrated inertia. It is important to select a moderate number of threatened species in order that achievable objectives can be set for the Parties. Article 1.2 calls for an emphasis on endangered and vulnerable species, but there is no rigid requirement that species should be so threatened in order to merit inclusion in the Appendices. Indeed, some of the species already listed suggest that it was positively not the intention of the Parties to limit their selections to threatened species (e.g. the Hedge Sparrow Prunella modularis is listed in Appendix II). This practice of listing non-threatened species is not recommended for invertebrates, but a certain degree of flexibility is sometimes needed, particularly for species that have received special attention in various parts of their range (e.g. Formica rufa, Helix pomatia).

- 2) The species' range in Europe should not be marginal to a much wider range outside Europe.

Rationale: Many invertebrates are highly vagile, their ranges contracting and expanding under varying ecological conditions. In the UK, for example, more than 20 larger moths have established themselves as breeding species during this century (Kennard, 1974). While it is often good to encourage new natural arrivals in Europe, it would not be sensible to utilize limited resources in protecting the breeding and resting sites of such species if they are likely to disappear in response to changing environmental

conditions beyond human control. Having said this, individual Parties should not be discouraged from taking independent action to preserve species on the edge of their range. It is often such species that are lost first, and a strong public response may result. For example, in the UK much effort and finance has been put into reintroductions of the Large Copper (Lycaena dispar) and the Large Blue (Maculinea arion). Species on the edge of their range may show greater genetic variation than is exhibited at the centre of their range and, in such circumstances, may have an enhanced value in the conservation of genetic diversity.

- 3) The species must be reasonably easy to identify, and preferably familiar to members of the general public.

Rationale: Hundreds, perhaps thousands, of European invertebrates may be threatened with extinction. Many of these are small or minute species that are very difficult to identify in nature. For most species of this kind, the requirements of the Bern Convention would be very difficult or impossible to enforce, thus embarrassing the Parties and undermining the aims of the Convention. In addition, the listing of obscure and cryptic insects will only serve to alienate the cause of insect conservation from the people of Europe.

- 4) In line with other listings in the Appendices to the Convention, only full species should be considered.

Rationale: While accepting that many well-known subspecies of European insects are under threat, and recognizing that threatened subspecies represent the first step towards threatened species, taxonomic difficulties and problems in weighting priorities preclude consideration of subspecies.

These first four criteria are of over-riding importance. However, a complete analysis of European invertebrates using these criteria might still conclude with a longer list than is required at this time. In evaluating a candidate list for selection of a final, well balanced list of species to be added to the Appendices of the Convention, the following factors have also been taken into consideration:

- 5) Invertebrates listed in the Bern Convention should, as far as possible, be selected from a wide range of habitats, but particularly threatened ones.

Rationale: Given that the listing of invertebrates on the Bern Convention Appendices will be a highly selective procedure, it will be helpful to national conservation agencies of the Parties if a wide range of habitats could be represented. Possibilities include Mediterranean formations, cold-winter deserts of south-eastern Europe, montane and highland formations, temperate forests and woodlands, grasslands and pastures, temperate coniferous forests, wetlands and coastal environments. Article 3.1 of the Convention calls for the Parties to pay particular attention to endangered habitats.

- 6) Invertebrates listed in the Bern Convention should, as far as practicable, be selected from a wide variety of phyla and classes.

Rationale: It is valuable to demonstrate that threats such as habitat destruction and pollution can have serious effects on a wide variety of invertebrates.

- 7) The final selection of invertebrates for listing on the Bern Convention should, if possible, embrace a wide geographical coverage.

Rationale: One of the strengths of the Convention is that it encourages international cooperation. To utilise this strength fully requires a species list that may include some narrow endemics, but consists mainly of more widespread but nevertheless threatened species.

The following species have been selected from many thousands of invertebrates that are listed as threatened in European nations. Whilst every effort has been made to select species that fit the adopted criteria given above, the species are by no means uniform in their degree of actual or perceived threat. The author has taken advice from many authorities, but there is still a need for critical discussion. With the gathering of new data, some of the proposed species will appear less worthy, while other, unlisted, species will merit consideration. The species described below can only be offered as a preliminary selection that will benefit greatly from wider debate and discussion.

5. ARTHROPODA - INSECTA

The subphylum Uniramia comprises the Insecta, Chilopoda, Diplopoda, Pauropoda and Symphyla. The latter four groups, collectively often known informally as the myriapoda, are not known to include species that are seriously under threat in Europe. The insects, however, are under threat almost everywhere, in places in large numbers of species.

Insects not only comprise the most diverse group of organisms on earth, their species numbers also exceed those of all other animals and plants combined. About a million insects are known to science, the majority of them from the tropics. Many times this number may await discovery, but much of the European fauna is fairly well known, particularly the Coleoptera, Lepidoptera, Odonata, Orthoptera and some sections of the Hymenoptera and Neuroptera. Although no attempt has ever been made to list the European insects, there are believed to be in the order of 60,000-100,000 species. The numerous ways in which insects are of value to humankind have been well documented (e.g. Wells, Pyle and Collins, 1983), yet there is also growing cognizance of the fact that many species are suffering reductions in their range through human agencies. Recent estimates suggest that 10 per cent of Europe's insects and other invertebrates are threatened with extinction (Group of Consultants for Invertebrates, 1983).

The vast majority of endangered insects are threatened by destruction or deterioration of their habitat, caused by human activity (Gepp, 1981; Stubbs, 1981). Destruction of ancient woodlands, land drainage, grassland management, changes in forestry practice, atmospheric pollution, pesticide application and urbanization all take their toll (Heath, 1981b; Wells, Pyle and Collins, 1983). Contrary to popular belief, rather few of Europe's insects are threatened as a consequence of direct exploitation by man. There are isolated cases where collecting has caused population declines and conservation concern (e.g. Anon., 1980; Bourgogne, 1971; for a wider discussion see Collins, 1985), but in general the responsible collector will have no lasting impact (Morris, 1976). A number of collecting codes have been prepared for guidance in collecting practices (e.g. JCCB1, undated; Lepidopterists' Society, 1982; Commissie voor Inventarisatie, 1980).

Nevertheless, there are growing fears that the escalating extent of European commercial trade in invertebrates (particularly insects), with rapidly rising prices, widespread abuse of codes, conventions and legislation, and little or no governmental monitoring or control, may soon lead to an unacceptable level of impact on some wild populations. A full discussion of the commercial trade is beyond the remit of this paper, but a more detailed investigation is warranted.

With possibly 6000-10000 insect species under threat in Europe, it is a major task to select a few dozen suitable for listing on the Appendices of the Bern Convention. However, using the criteria given in section 4, wide-ranging enquiries have been sent to European specialists, all of whom are acknowledged in section 13.

5.1 The Apterygota

The primitively apterous insects in the four orders Thysanura, Diplura, Protura and Collembola are not widely recognized as being under threat. The japygid dipluran Heterojapyx dux Skorikov, from southern USSR, is listed as Endangered in the Red Data Book of the USSR (Bannikov and Sokolov, 1984). It has a restricted distribution but is too cryptic for listing under the Bern Convention.

5.2. The Exopterygota

The Pterygota, or winged insects, are divided between the 16 orders of Exopterygota and 9 orders of Endopterygota.

Order	Candidates presented	No suitable candidates	Absent from Europe
5 Ephemeroptera		X	
6 Odonata	X		
7 Plecoptera		X	
8 Grylloblattodea			X
9 Orthoptera	X		
10 Phasmida		X	
11 Dermaptera		X	
12 Embioptera		X	
13 Dictyoptera		X	X
14 Isoptera			X
15 Zoraptera			X
16 Psocoptera		X	
17 Mallophaga		X	
18 Siphunculata		X	
19 Hemiptera	X		
20 Thysanoptera		X	

In the above table, nine orders are listed as not having suitable candidates for the Bern Convention, three of which are absent from Europe. The other six are unsuitable because of a) lack of data b) no species are known to be threatened or c) they are too cryptic or difficult to identify. The Ephemeroptera (may-flies) and Plecoptera (stone-flies) are undoubtedly suffering setbacks due to destruction and pollution of their freshwater habitats. Some are listed in Red Data Books, e.g. for FRG (V. Puthz in Blab et al. 1984) and the USSR (Bannikov and Sokolov, 1984). In the Netherlands a number of may-flies are known to be extinct (as in FRG) and sources of large rivers have been severely disturbed in this century (Mol, 1981). Amongst the Plecoptera, 44 species are listed by P. Zwick in the FRG Red Data Book, 12 of them extinct in that country. There is also concern for the endemics of Lake Baikal, USSR, such as Baikaloperla elongata.

The Phasmida (stick insects) have a few representatives in the Mediterranean region, but most species are to be found in the subtropics and tropics. Two species (Baculum ussurianum Bey-Bienko and Ramulus nana Mistshenko) are listed in the USSR Red Data Book (Bannikov and Sokolov, 1984) but none are known to be widely threatened in Europe.

Of the Dermaptera (earwigs) only Forficula vicaria Semenov, 1902, from eastern USSR and Labidura riparia (Pall.) in West Germany and Austria are cause for concern (Bannikov and Sokolov, 1984; Blab et al., 1984). The latter at least is common in southern Europe.

Haploembia solieri Rambur from the Caucasus region is the only species of Embioptera listed as threatened in the Palaearctic (Bannikov and Sokolov, 1984).

Data are lacking for the Psocoptera (book-lice), Mallophaga (biting- or bird-lice) and Siphunculata (sucking lice), the latter two orders being parasitic.

Twenty five species of Thysanoptera (thrips) are listed by R. zur Strassen in the Red Data Book for FRG (Blab et al., 1984), but none are known to be widely threatened in Europe.

The Dictyoptera are often sub-divided into two orders, the cockroaches (Blattodea) and the mantids (Mantodea). Few Palaearctic cockroaches are known to be threatened. Cryptocercus relictus Bey-Bienko is listed as vulnerable in the eastern USSR (Bannikov and Sokolov, 1984). In West Germany Phyllodromica megerlei (Fieb.) is extinct, while Ectobius pallidus (Oliv.) and Phyllodromica maculata (Schreb.) are listed as endangered (Blab et al., 1984). None of these is known to be under threat on the European scale, but more research is needed. The USSR Red Data Book lists three praying mantids, Empusa fasciata Brulle, Bolivaria brachyptera (Pallas) and Hierodula tenuidentata Saussure. None extend into western Europe and all are presently unsuitable for the Bern Convention. The praying mantis, Mantis religiosa L., is protected in Austria (parts) Belgium, Czechoslovakia (part), F.R.G., Hungary, Italy (part) and Luxembourg. Nevertheless, it is quite commonplace in much of southern Europe and its range extends into Asia and Africa (Zahradnik, 1977). It is therefore unsuitable for the Bern Convention. Apteromantis aptera, a narrowly distributed endemic from Spain, is considered to be endangered and should be listed on the appendices of the Bern Convention. Details are given below. Within their orders, data sheets are presented in the sequence of families given by Parker (1982).

1. Apteromantis aptera (Fuente, 1984) ENDANGERED

Phylum ARTHROPODA Class INSECTA

Order MANTODEA Family MANTIDAE

Common names None known. This is a species of praying mantis.

Distribution

South and central Spain.

Status in Europe

Spain Endangered.

Habitat and ecology

On shrubs and small bushes in hilly heathlands. Prefers dry, hot habitats (xerophil, thermophil). Carnivorous and flightless, with adults present in June-August. (Harz and Kaltenbach, 1976, A. Kaltenbach in litt., 22.5.86).

Reasons for decline

Alterations to its habitat by human influence (agriculture etc.). Being flightless, mating and gene-mixing between isolated biotopes is very difficult and the species is subject to localized extinctions.

Conservation measures taken

None known.

Conservation measure proposed

Surveys of its habitat and precise mapping of its distribution are needed. Suitable protected areas should be set up, monitored and managed appropriately. Listing on Appendix II of the Bern Convention is recommended.

Odonata

The damselflies and dragonflies of Europe are the subject of a detailed study for the Council of Europe currently being carried out by Jan van Tol and Marian J. Verdonk. The final report is expected to be published during 1986/87. The data sheets that follow are adapted from a draft of the van Tol report, with some additional comments. The opportunity to use J. van Tol's work and research is gratefully acknowledged. All van Tol's endangered taxa are listed here with the exception of Cordulegaster bidentata sicilica Fraser, 1929. The species bidentata is not threatened, being widespread in central and southern Europe. However, C. b. sicilica, endemic to Sicily, Italy, is seriously endangered through pollution of aquatic biotopes and lowering of ground-water levels. It is certainly greatly in need of protection, but is omitted from this proposal under criterion 4.

2. Coenagrion freyi Bilek, 1954 (= C. hylas freyi)

ENDANGERED

Phylum ARTHROPODA

Class

INSECTA

Order ODONATA

Family

COENAGRIONIDAE

Common names Frey's Damselfly (En), Bileks Azurjungfer (Ge), Sibirische Azurjungfer (Ge)

Distribution

Formerly Germany (Bavaria), but now confined to small lakes in the Alps of Austria and Switzerland

Status in Europe

Note: Taxonomically, this dragonfly is of uncertain status, it is considered by some to be a subspecies of C. hylas, which is found in Siberia and Manchuria, 8000 km away. It is listed as C. hylas by van Tol and Verdonk (in prep.).

Austria

Tiny alpine population (Heideman, 1974).

Germany (FRG)

Extinct. The type population was found at the Zwingsee at Inzell, South-Bayern, but became extinct in the past 10-15 years (Dumont, 1971; Schmidt, 1977). Its original discovery was the best odonatological finding of this century in Europe. Should it be rediscovered, it is already protected (as C. hylas) by law of 19.12.86.

Switzerland

Probably also a tiny alpine population, recorded only from photographs, not specimens. Precise locality kept secret.

Habitat and ecology

Habitat at moderate altitude in the littoral zone of alpine lakes. Breeds in pools and stagnant waters, favouring Equisetum beds in shallow, offshore waters. Ecological requirements, in terms of climatic patterns and altitudinal limits, may be highly specific.

Reasons for decline

Development of recreational facilities, including a hotel, in the Zwingsee has probably caused its demise there. By 1964 the damselfly was already considered seriously endangered (Lieftinck, 1964). There are unconfirmed reports that excessive collecting has exacerbated the decline of this species, the only dragonfly for which such fears have been expressed.

Conservation measures taken

Extensive searching in suitable German Lakes. Given high priority by the IUCN/SSC Odonata Specialist Group.

Conservation measures proposed

Continuing thorough surveys of the Corinthian Alps (Dumont, 1971). Careful preservation of ambient conditions in lakes known to harbour the species. Coenagrion freyi is a severely threatened species requiring coordinated conservation action. It is a high priority for protection under Appendix II of the Bern Convention.

3. <u>Coenagrion mercuriale</u> (Charpentier, 1840)		ENDANGERED	
Phylum	ARTHROPODA	Class	INSECTA
Order	ODONATA	Family	COENAGRIONIDAE

Common names Southern Damselfly, Southern Coenagrion (En), L'Agrion de Mercure (Fr), Helm-Azurjungfer (Ge).

Distribution

Mediterranean basin: Southern part of Europe and northern Africa (where it seems to be not uncommon). Rather widespread in central and south-western Europe (all records from the Balkans have to be considered as doubtful).

Status in Europe

<u>Austria</u>	A very rare species, only known from Nordtirol.
<u>Belgium</u>	Very rare and local; until recently believed to be extinct, but one breeding colony now known in the province of Namur.
<u>Czechoslovakia</u>	Status uncertain; mentioned from Moravia and Slovakia, but records need confirmation.
<u>France</u>	Uncommon and rather widespread, but lacking in central and northern France. Declining, but not under immediate threat.
<u>Germany (FRG)</u>	Endangered. Very rare and declining, only a few recent records near river Rhine. Protected by law of 19.12.86.
<u>Germany (GDR)</u>	Endangered and very rare.
<u>Italy</u>	Subspecies <u>C. m. castellanii</u> uncommon, although known from all parts of the country (incl. Sicily).
<u>Luxembourg</u>	Several records from northern Luxembourg; present status not precisely known.
<u>Netherlands</u>	Two old records from the eastern part of the Netherlands.
<u>Portugal</u>	Status unknown.
<u>Spain</u>	Widely distributed species, but rare, at least in southern Spain.
<u>Switzerland</u>	A very rare, local and declining species, in most parts of the country now extinct. Confined to a few small calcareous brooks in north-western Switzerland.
<u>UK</u>	Vulnerable (Shirt in press). Very limited distribution in south-western and southern England and Wales.

Reasons for decline

Rare and declining in all parts of its range. It seems to be severely affected by general improvements in watercourses, as well as by pollution and eutrophication of small running waters.

Conservation measures taken

Listed in a number of Red Data Books, but no other measures known.

Conservation measures proposed

This species is in danger of extinction and suitable biotopes should be protected. Suitable for listing on Appendix II of the Bern Convention.

For full details and references see van Tol and Verdonk (in prep.).

4. Calopteryx syriaca Rambur, 1842

ENDANGERED

Phylum ARTHROPODA

Class

INSECTA

Order ODONATA

Family

CALOPTERYGIDAE

Common names None known

Distribution

Confined to the river systems Jordon, Litani and Orontes (Turkey, Syria and Jordan).

Status in Europe

Turkey Only known from the area close to the Syrian border, where it is presumed to be under threat.

Habitat and Ecology

Running waters, further details unknown.

Reasons for decline

Decline has been recorded from the Jordan valley. In a recent study no specimens were found in the Dead Sea area, although it was found there earlier this century. This seems to be mainly due to enormous changes in the aquatic environment caused by construction of dams and intensification of agriculture, causing changes in water level.

Conservation measures taken

None known

Conservation measures proposed

Conservation of a number of water catchment areas is needed to safeguard the survival of several endemic species of the central part of southern Turkey, Syria and Jordan. Further limnological research in the Middle East is needed. The odonatofauna of the east coast of the Mediterranean between Iskenderun and the Dead Sea area is interesting and complex, with several endemics. Suitable for listing on Appendix II of the Bern Convention.

For full details and references see van Tol and Verdonk (in prep.).

5. Ophiogomphus cecilia (Fourcroy, 1785) ENDANGERED
 (= O. serpentinus)

Phylum	ARTHROPODA	Class	INSECTA
Order	ODONATA	Family	GOMPHIDAE

Common names Grüne Keiljungfer (Ge), le Gomphus serpentia (Fr).

Distribution

Confined to Siberia, western Asia and Europe. The nominate species is distributed from Finland to central France, Italy and Hungary. Several other subspecies occur in Siberia.

Status in Europe

- | | |
|-----------------------|--|
| <u>Austria</u> | Rare and local species, decreasing, and e.g. extinct in Burgenland. |
| <u>Czechoslovakia</u> | Known from all three parts (Bohemia, Moravia and Slovakia); present status unknown. |
| <u>Denmark</u> | Rare in Jylland; decreasing. |
| <u>Finland</u> | Although uncommon, this species is not threatened in Finland. Northernmost populations up to the Arctic circle. |
| <u>France</u> | Rare and local species; strongest populations in Central France. |
| <u>Germany (FRG)</u> | Endangered. Very rare and much threatened; decreasing since 1900 because of water pollution. Protected (as <u>O. serpentinus</u>) by law of 19.12.86. |
| <u>Germany (GDR)</u> | Endangered. Very rare and local, decreasing in recent years. |
| <u>Hungary</u> | Rare; no data on decline available. |
| <u>Italy</u> | Very rare in central and northern Italy; at present only one strong population known. |
| <u>Luxembourg</u> | Rare. |
| <u>Netherlands</u> | Extinct since the 1940s. Only know from the south-eastern part of the country. |
| <u>Sweden</u> | Rare, only a few localities in north-eastern Sweden close to the border with Finland. |
| <u>Switzerland</u> | Only one stable population in recent years; very rare and now nearly extinct. |

Habitat and ecology

A species of rather cold, very clear and unpolluted streams with moderate current velocity and sandy bottoms in semi-forested areas.

Reasons for decline

This species has shown a very serious decrease during recent decades, and is under serious threat of extinction nearly everywhere in Europe. The only exception seems to be Finland, from where it is reported as stable. Decline seems to be caused by water pollution and canalization of streams.

Conservation measures taken

None known.

Conservation measures proposed

Conservation of this species needs high priority. The protection of streams and their catchment areas, where this species still has strong populations, is urgently needed and strongly recommended. It seems to inhabit a very peculiar biotope, most probably accompanied by several other rare aquatic invertebrates.

For full details and references see van Tol and Verdonk (in prep.).

6. Stylurus flavipes (Charpentier, 1825)
(= Gomphus flavipes)

ENDANGERED

Phylum ARTHROPODA

Class INSECTA

Order ODONATA

Family GOMPHIDAE

Common names Le Gomphus à pattes jaunes (Fr), Asiatische Keiljungfer (Ge)

Distribution

Northern Palaearctic, including central and south-eastern part of Europe.

Status in Europe

Albania A few old records only.

Bulgaria Although recorded several times, its present status is unknown.

France Apparently confined to rivers in the northern part of France; recently discovered in the rivers Loire and Indre.

Germany (FRG) Extinct for c. 50 years; formerly recorded from several localities. Should it be rediscovered, it is already protected (as Gomphus flavipes) by law of 19.12.86.

Germany (GDR) A long known strong population in the River Spree, where it is still present although under threat.

Greece Recorded from several river systems in the northern part of Greece, e.g. Lemnos, Tessaglia (near Trikala) and Aliakmon river.

Hungary Rare.

Italy Several records from large rivers in the northern part of Italy (Po); even some channelized rivers are known to have breeding populations.

Luxembourg Several older records, present status unknown.

Netherlands Extinct since the early 20th century; several records from the river Rhine in the 19th century.

Poland Several records during the last decades.

Romania An uncommon species, its present status unknown.

Switzerland Only one record from Neuchâtel, 19th century.

Turkey Widespread; records from Turkey Anatolia pertain to Stylurus flavipes lineatus; in the European part of Turkey inhabiting the Ergene river.

United Kingdom Extinct. Only 19th century records, believed to be stragglers.

Yugoslavia Recorded from Serbia, Montenegro and Macedonia; present status unknown.

Habitat and ecology

Lower courses of large and (nearly) unpolluted rivers. The larvae seem to live in the steep, sandy banks and detritus bottoms of bends in rivers. Adult insects fly along the sandy banks along rivers.

Reasons for decline

Decline and even extinction of populations has been reported from most countries, especially in central and north-western Europe. Most populations destroyed by the severe pollution of river systems.

Conservation measures taken

None known.

Conservation measures proposed

Conservation of river systems is of utmost importance. Although it is clearly difficult to preserve whole catchments, at least a few of these should be completely protected against pollution.

For full details and references see van Tol and Verdonk (in prep.).

7. Aeshna viridis (Eversmann, 1836) ENDANGERED

Phylum	ARTHROPODA	Class	INSECTA
Order	ODONATA	Family	AESHNIDAE

Common names L'Aeschne verte (Fr), Grüne Mosaikjungfer (Ge).

Distribution

Europe and (south-western?) Siberia. Nearly confined to the northern part of Central Europe, but also marginal in northern Europe (Hungary).

Status of Europe

Austria Only one locality in northern Austria.

Czechoslovakia Mentioned from Bohemia.

Denmark Rare and local species, declined through loss of suitable sites with Stratiotes.

Finland Very rare and local, only known from two localities.

Germany (FRG) Endangered. Confined to the northern part of the country, particularly Schleswig Holstein, Nordrhein-Westfalen and Niedersachsen. Protected by law of 19.12.86.

Germany (GDR) Threatened. In the northern part of Brandenburg and Mecklenburg apparently not rare; but in other parts absent or very rare.

Hungary Very rare.

Netherlands Although widespread in the Central part of this country, it is generally a rare species. Perhaps the strongest populations of Central Europe are here.

Sweden Uncommon, confined to southern and central Sweden.

Yugoslavia Some unconfirmed records from Dalmatia.

Habitat and ecology

Fen and low peatmoor areas, usually meso- or eutrophic. This species is virtually confined to waters with a vegetation of Water Soldier, Stratiotes aloides.

Reasons for decline

Decline has been reported from most European countries. This is almost certainly due to habitat destruction, fishery activities, pollution and eutrophication; there are also several reports of a steady decline of Stratiotes fields, due to a virus infection.

Conservation measures taken

Listed in several Red Data Books.

Conservation measures proposed

Conservation of large low peatmoor fen areas with Stratiotes fields needs high attention. This water plant may also develop in pools along rivers, which may be attractive to conserve when water quality is sufficiently high. Suitable for listing on Appendix II of the Bern Convention.

For full details and references see van Tol and Verdonk (in prep.).

8. Oxygastra curtisii (Dale, 1834)

ENDANGERED

Phylum ARTHROPODA

Class INSECTA

Order ODonATA

Family CORDULIIDAE

Common names La Cordulie à corps fin (Fr), Orange spotted Emerald (En),
Gekielte Smaragdlibelle (Ge).

Distribution

Northern Africa (rare) and western Europe.

Status in Europe

Belgium Rare in eastern Belgium; no records since 1979.

France A not uncommon species with stable populations; abundant at some sites.

Germany (FRG) Not resident, sometimes breeding for a few years.

Italy Rare and local species. Especially found in the Prealpine area and the Appenines.

Netherlands Very rare and irregularly breeding species, only a few records since 1928.

Portugal Common, although local, species with stable populations.

Spain Uncommon and local species.

Switzerland Very rare and declining species. Recently only a few records in southern Tessin.

United Kingdom No records since 1960, old records from Moors River in Hampshire and Bournemouth; this species seems to have disappeared through pollution of its biotopes (Shirt, in press).

Habitat and ecology

Slowly running waters with or without emergent vegetation with banks shaded by dense overhanging vegetation; trees and shrubs with exposed roots at the water's edge. The dispersal behaviour is quite peculiar. Although it seems to be an unwilling flyer, it may reach localities far to the north in some years. In such cases it may breed for some years, disappearing after one or more severe winters.

Reasons for decline

The habitat of this species is rare and much threatened in most areas. Agriculture and other cultivation activities in areas with slowly moving waters have particularly influenced the populations of this species.

Conservation measures taken

None known

Conservation measures proposed

For this species extensive nature reserves in areas with suitable biotopes are needed. These biotopes are, however, usually very difficult to protect, since they are situated in areas very suitable for cultivation.

For full details and references see van Tol and Verdonk (in prep.).

9. Macromia splendens (Pictet, 1843)

ENDANGERED

Phylum ARTHROPODA

Class INSECTA

Order ODONATA

Family CORDULIIDAE

Common names Shining Macromia (En), Macromie Eclatante (Fr), La Cordulie Splendide (Fr)

Distribution

Restricted to the Départements Lot, Dordogne, Charente, Gard, Var and Hérault of south-west France. Early records included Portugal and Spain, (Dumont, 1971; Lieftinck, 1965), and some sites on the Iberian Peninsula have recently been confirmed. The presence of a Macromia in Europe is most remarkable; the genus is widespread and better known in South East Asia.

Status in Europe

France Described as Rare by Wells, Pyle and Collins (1983), but this was optimistic. Endangered or Vulnerable is more realistic.

Spain Once thought to be very rare on the Iberian Peninsula, but now known to be fairly widespread in northern regions, although localized (Aguilar et al., 1985).

Portugal A few localities; precise distribution and status unknown, but perhaps more widely distributed than formerly believed.

Habitat and ecology

Breeds in larger, slow-running, and summer-warm montane streams at middle altitudes, where the larvae live in mud. Records suggest biennialism, with regular appearance of adults only every two years. Frequents sites in rivers where current is nearly absent, superficially resembling lakes. Further information in Lieftinck (1965) and Aguilar et al. (1985).

Reasons for decline

Water pollution and stream channelization have caused problems in French localities. Over-collecting could become a problem, although this fast-flying species is very difficult to capture. Macromia splendens is probably a survivor of the warmer climatic conditions that preceded the Pleistocene glaciations. Its closest relatives live in Central Africa and India.

Conservation measures taken

None known

Conservation measures proposed

Protection in reserves. In addition, pollution must be prevented on tributaries of the Garonne, notably the River Lot and its tributaries the Célé, Aveyron and Crieulon (Dumont, 1971). Surveys and action plans are needed, along with further ecological work (Wells, Pyle and Collins, 1983). Macromia splendens is recommended for protection under Appendix II of the Bern Convention.

10. <u>Leucorrhinia albifrons</u> (Burmeister, 1839)		ENDANGERED	
Phylum	ARTHROPODA	Class	INSECTA
Order	ODONATA	Family	LIBELLULIDAE

Common names La Leucorrhine à front blanc (Fr), Östliche Moosjungfer (Ge).

Distribution

Central and northern Europe, western Siberia.

Status in Europe

<u>Austria</u>	Very rare and local.
<u>Czechoslovakia</u>	Only known from Moravia, and presumed to be extinct now.
<u>Denmark</u>	Extinct.
<u>Finland</u>	Not threatened. Generally uncommon, but there are a number of stable populations in lake districts south of 64°N.
<u>France</u>	Very rare and local species, confined to the mountainous areas (e.g. Lorraine, the Alps, Vosges and Jura); one locality in the Brenne (Indre).
<u>Germany (FRG)</u>	Endangered. Rare; recent records only from the northern part of the country (Niedersachsen, Schleswig-Holstein). Protected by law of 19.12.86.
<u>Germany (GDR)</u>	Threatened. Very rare and local species. Decreasing.
<u>Netherlands</u>	Very rare and local species, probably extinct.
<u>Norway</u>	Only two localities in the southern part.
<u>Poland</u>	Only a few records known from literature; present status unknown, but apparently local and uncommon.
<u>Sweden</u>	A few records in southern and eastern Sweden. Declining.
<u>Switzerland</u>	Very rare and local, declining (only four sites left in the early 1980s); seems to be a poor colonizer.

Habitat and ecology

Mesotrophic and oligotrophic pools with floating vegetation of e.g. Potamogeton and Nymphaea.

Reasons for decline

Decline of this very restricted species has been mentioned from nearly all countries in Europe (Finland excepted). The causes seem to include habitat destruction, eutrophication as well as oligotrophication of the mesotrophic moorlands and peatbogs which this species seems to prefer. Oligotrophication has been attributed to acid precipitation; this has greatly influenced the pH, and consequently the vegetation of this rare and vulnerable biotope.

Conservation measures taken

None known.

Conservation measures proposed

All European sites where this species has permanent and stable populations are worthy of protected status; Leucorrhinia albifrons is a characteristic species of a very peculiar and much threatened biotope. Listing on Appendix II of the Bern Convention will draw attention to the plight of both the species and its habitat.

For full details and references see van Tol and Verdonk (in prep.).

11. Leucorrhinia caudalis (Charpentier, 1840) ENDANGERED

Phylum	ARTHROPODA	Class	INSECTA
Order	ODONATA	Family	LIBELLULIDAE

Common names La Leucorrhine à large queue (Fr), Zierliche Moosjungfer (Ge).

Distribution

Europe and the extreme west of Siberia. Central and part of northern.

Status in Europe

- | | |
|-----------------------|---|
| <u>Austria</u> | Rare and local species. |
| <u>Belgium</u> | Extinct. Only some older records from north-eastern Belgium. |
| <u>Czechoslovakia</u> | Present, but status unknown. |
| <u>Denmark</u> | Extinct. Formerly a rare species. |
| <u>Finland</u> | Widely distributed south of 64°N, although uncommon. Quite a few stable populations. |
| <u>France</u> | Very rare and local in the central and western part. |
| <u>Germany (FRG)</u> | Endangered. Known from all parts of the country, but rare and much threatened. Recently recorded from Bayern, Baden-Württemberg, and Rheinland-Pfalz, where it is confined to a few sites in the 'Altrhein' area. Protected by law of 19.12.86. |
| <u>Germany (GDR)</u> | Extinct; formerly not an extremely rare species (e.g. ten localities in Brandenburg in the 1950s) but no records during the last decade despite searches. |
| <u>Hungary</u> | Very rare. |
| <u>Netherlands</u> | Very rare, especially during the last decades; much threatened. |
| <u>Norway</u> | Very rare, confined to one locality in Aust-Agdar. |
| <u>Poland</u> | A local and uncommon species, but precise present status unknown. |
| <u>Sweden</u> | Rare, confined to the southern and eastern part. |
| <u>Switzerland</u> | Extinct. Formerly very rare, but now presumed extinct. |

Habitat and ecology

Oligotrophic, but particularly mesotrophic moorland pools and peatbogs with floating vegetation, e.g. of Potamogeton and Nymphaea, not in mountainous areas.

Reasons for decline

Declining virtually throughout its range. This seems to be due to habitat destruction as well as habitat deterioration as is mentioned under L. albifrons (eutrophication as well as oligotrophic of moorlands).

Conservation measures taken

None known specifically for the species. It is present in the Réserve du Pinail (137 ha) in the Moulière Forest, Département de Vienne, France (N.W. Moore, pers. comm.).

Conservation measures proposed

Species in great need of conservation. Protection measures have to include biotope protection, which may be difficult since many biotopes suffer from Europe-wide loss of quality of the environment. Suitable for listing on Appendix II of the Bern Convention.

For full details and references see van Tol and Verdonk (in prep.).

12. Brachythemis fuscopalliata (Selys, 1887)

ENDANGERED

Phylum ARTHROPODA

Class

INSECTA

Class ODONATA

Family

LIBELLULIDAE

Common names None known

Distribution

Iraq, northern Israel (possibly extinct), southern Turkey; presumably also in Syria.

Status in Europe

Turkey

Mediterranean coast of southern Turkey (Adana). Status there uncertain, but possibly similar to adverse situation in Israel (see below).

Habitat and ecology

Swampy stretches of slow running rivers and marshy areas rich in drainage canals.

Reasons for decline

In Israel this species is under serious threat from eutrophication and drying up of streams and marshlands. It was apparently common in the 1950s in the Lake Hula area of Israel where it appeared to be absent in the 1970s.

Conservation measures taken

None known.

Conservation measures proposed

Conservation measures for aquatic biotopes in southern Turkey/Lebanon/Israel are needed, since all remaining waterbodies of this very arid area are under heavy pressure of eutrophication and drying up due to extensive agricultural irrigation schemes, drinking water supply as well as climatological reasons. Suitable species for listing on Appendix II of the Bern Convention.

For full details and references see van Tol and Verdonk (in prep.).

Orthoptera

The conservation of Orthoptera has been usefully introduced by Ingrish (1985). Orthoptera occur throughout Europe, but most species prefer environmental temperatures of 30-40°C and many are therefore restricted to southern Europe. Good Orthoptera habitats are dry or semi-dry grassland, open sandy areas (heaths etc.) and steppes. Water-meadows are also important localities for certain species.

A number of Orthoptera are listed in European Red Data Books and legislation. In the UK three Orthoptera are endangered and two vulnerable (Shirt, in press). Gryllus campestris (the Field Cricket) and Gryllotalpa gryllotalpa (the Mole Cricket) are protected by law but neither is rare on the mainland. Indeed, the latter species is sometimes a pest of cultivated crops in Europe. Similarly, Acrida hungarica is protected in Austria and Hungary although common in southern Europe, and Tettigonia viridissima is threatened in Belgium but abundant elsewhere (Leclercq et al., 1980). Eight species of Orthoptera are listed in the USSR Red Data Book (Bannikov and Sokolov, 1984). In Austria a long list of Orthoptera is considered to be under threat, some of them also listed elsewhere (e.g. Saga pedo listed in USSR and protected in Czechoslovakia and Hungary, Bryodema tuberculata protected in FRG). Most species are threatened only locally, not on the broader European front (except Saga pedo, see below).

In West Germany nine Orthoptera are protected. Again, more research is needed, but Ephippiger ephippiger is a local problem, as are Oedipoda coarulescens (Sweden to Asia Minor and North Africa) and O. germanica (Germany to Western Asia). The latter species has become rare in parts of its range, but is still common elsewhere. It requires monitoring.

In West Germany four Orthopterans are extinct (Arcyptera microptera (F.W.), Metrioptera saussureiana (Frey Gessn.), Platycleis tessellata (Charp.) and Tetrix tuerki Krauss), a further twenty are endangered (categories 1 and 2) and six vulnerable. One of the endangered species, Ephippiger ephippiger (Fieb.), is a long-horned grasshopper that is regressing throughout the northern part of its range, from the Netherlands to Ukraine. In southern Europe, however, where suitable dry habitat is plentiful, the species is much more common.

This situation is common amongst the Orthoptera of Europe. Most regions of Central and Northern Europe are outside the optimal climatic range required by the Orthoptera., so the species are scattered amongst the small areas that fulfill their requirements. Meanwhile, in southern Europe, species that are of concern in the north can be quite commonplace. For this reason there are few Orthoptera with a wide European range that are known to be suitable for the Bern Convention. Saga pedo is an exception.

Certain narrow endemics may be more suitable for listing. Two species listed in the West German Red Data Book, Bryodema tuberculata, a boreo-alpine species, and Gampsocleis glabra, also seriously threatened, may be suitable. However, the latter is difficult to identify, and data are lacking for both (S. Ingrish in litt., 25.3.86).

Spain has a remarkably rich orthopteran fauna, recently the subject of a thorough assessment which led to the first Red Data Book devoted entirely to this order (Gangwere et al., 1985). A total of 41 threatened species are presented, all of which are endemic to the Iberian Peninsula.

Correspondence with the authors has narrowed the candidates for the Bern Convention down to five species of which one, Baetica ustulata (Rambur) is of outstanding suitability and is reviewed in full below. The other four are:

1. Zeuneria burriana (Uvarov). A distinctive shield-backed katydid endemic to the Cantabrian mountains (northern Spain).
2. Navasius nugatorius (Navas). An endemic pamphagine grasshopper known only from the low mountains along the east coast of Spain.
3. Canariola emarginata Newman. A rare katydid known from only three specimens taken in the Sierra de Cazorla in southern Spain (Newman, 1964), but present in a semi-protected place, the Coto Nacional de Caza de las Sierras de Cazorla y Segura. Its only relatives are C. nubigena (Krauss) and C. willemsei Morales Agacino, both from the Canary Islands, suggesting that these are relict populations from the once widespread Tertiary rain forests of Mediterranean Europe and the Canaries. C. willemsei is only known from ten specimens while C. nubigena is not at all abundant and noted in the original description as being very hard to find (Morales Agacino, 1959, pp. 274-5). The whole genus Canariola is of great interest and worthy of conservation concern, but without further data it would be premature for listing on the Bern Convention.
4. Steropleurus politus (Bolivar). Like B. ustula, this is a black, wingless ephippigerine of high elevation. It lives under stones in the Sierras de Segura and La Sagra in southern Spain and is also present in the hunting preserve mentioned in 3 above.

In considering the Orthoptera for this review it has become clear to the authors that evidence of threats is building up over a broad front. At present the data are incomplete, particularly for southern Europe (except Spain) no-one has attempted a general overview. A thorough survey of the status of the Orthoptera in Europe is indicated.

13. Baetica ustulata (Rambur, 1838)

VULNERABLE

Phylum ARTHROPODA

Class INSECTA

Order ORTHOPTERA

Family TETTIGONIIDAE

Common names None known.

Distribution

Sierra Nevada, Granada Province, Spain

Status in Europe

Spain Vulnerable (Gangwere et al., 1985).

Habitat and ecology

This handsome black ephippigerine katydid belongs to a monospecific genus endemic to the high Sierra Nevada of southern Spain, where it is encountered in desolate areas almost up to the snow line (2,500-3,450m). It is a geophyte, found on bare ground or under stones and debris. Apparently active in the day, when it has been seen to crawl sluggishly. Surmised to be a carnivore, relying mainly on scavenging. Adults active between July and September (Gangwere et al., 1985).

Reasons for decline

Apparently vulnerable to the tourism developments planned for the fragile Sierra Nevada alpine communities in which it lives.

Conservation measures taken

Listed in the Iberian Red Data Book on Orthoptera (Gangwere et al., 1985). No practical steps have been taken.

Conservation measures proposed

Developments in the Sierra Nevada must take careful account of the fragile, high altitude communities of which this species is a member. Listing under Appendix II of the Bern Convention will raise the profile of the insect ~~itself~~ as well as drawing much-needed attention to the threatened biotope in which it lives.

14. Saga pedo (Pallas, 1771)

ENDANGERED

Phylum ARTHROPODA

Class

INSECTA

Order ORTHOPTERA

Family

TETTIGONIIDAE

Common names Predatory Bush-cricket (En), Magicienne Dentelée (Fr), Raubheuschrecke, Sägeschrecke, Riesenheuschrecke (Ge), Kobylka Saga (Cz), Niezdarka Dziewicza (Po), Furaszlabu Szöcske (Hu), for Russian see Bannikov and Sokolov, 1984..

Distribution

The genus Saga (sensu stricto) is restricted to Europe, Siberia and Asia Minor. Saga pedo is distributed in southern Europe, including the Pyrenees, Appenines and Balkan Peninsula, (but excluding Greece), parts of central Europe and south-eastern Europe to the Caucasus and south-western Siberia. Records of S. pedo from Asia Minor are not, in fact, attributable to that species (A. Kaltenbach in litt., 7.7.86). Saga pedo was at one time present as an artificial introduction in Michigan, USA (Cantrall, 1972), but the species is not believed to have survived there.

Status in Europe

Austria Endangered (Gepp, 1983).

Bulgaria No data.

Czechoslovakia Endangered. Protected by law. Distributed to the northern boundary of the country, in parts of Slovakia and Moravia (Caputa et al., 1982).

France Scarce, known only from tetraploid females (S.K. Gangwere in litt., 16.7.86).

Germany (FRG) Said to be present in southern areas, but not listed in German Red Data Book. Records may represent misidentifications; no specimens have been found in FRG during the last 30 years (A. Kaltenbach in litt., 17.7.86).

Hungary Endangered. Protected by law.

Italy Endangered.

Romania No data.

Spain No data on threats; the Red Data Book on Spanish Orthoptera (Gangwere et al., 1986) only deals with endemics. Possibly at one time rather common in central Spain (and the Pyrenees?) but few recent records (A. Kaltenbach in litt., 17.7.86; S.K. Gangwere in litt., 16.7.86)..

Switzerland Southern areas (S.K. Gangwere in litt., 16.7.86).

USSR Vulnerable. Listed in the Red Data Book (Bannikov and Sokolov, 1984). Distributed in southern regions, western Siberia, Caucasus to the Urals.

Yugoslavia Present at least in the Dalmatian Islands (S.K. Gangwere in litt., 16.7.86).

Habitat and ecology

A xerophilic and thermophilic species, preferring dry, sunny hills and shrubby slopes, with a tall, dense grass layer and bushes. In Central Asia Saga pedo inhabits the subarid steppes (Caputa et al., 1982). It has carnivorous feeding habits, generally taking other bush-crickets and grasshoppers. The adult phase is present between June and October, and is usually found either on high weeds or on low shrubs (Bannikov and Sokolov, 1984). Saga pedo has an unusual ability for parthenogenetic reproduction. Although males are occasionally recorded in the literature, these are all attributable either to other species of Saga or else they are female nymphs that have not developed adult female genitalia (A. Kaltenbach in litt., 7.7.86). The males therefore remain unknown. Parthenogenesis permits the spread of this species as eggs in soil that is transported for any reason. Saga pedo probably reached Michigan as a passenger on agricultural equipment.

Reasons for decline

There is no doubt that Saga pedo is in decline, and that this decline is exacerbated by human interference. Habitat destruction and alteration through agriculture, road-building, urbanization etc., are largely to blame. There is also a suggestion that the species may be declining through natural climatic and environmental change in Europe (S.K. Gangwere in litt., 16.7.86). In addition, Saga pedo individuals are vulnerable to gratuitous destruction by humans because of their large, fierce appearance, and their slow, crawling gait. The low reproductive rate is an added disadvantage. In the USSR the reduction in range in the south-eastern parts is the result of desert encroachment and the disappearance of steppe flora. In the steppes themselves agricultural extension (particularly ploughing) is causing decline (Bannikov and Sokolov, 1984). This species has minimal potential to extend its range by natural means, and is thus particularly vulnerable to local extinctions (Caputa et al., 1982). However, its capacity for parthenogenesis strongly favours the survival of small or transplanted populations.

Conservation measures taken

Protected in Czechoslovakia and Hungary, listed in Red Data Books in Austria and USSR.

Conservation measures proposed

Surveys of distribution and location of main breeding localities are needed. Appropriate management and conservation of the best localities is desirable. Listing on Appendix II of the Bern Convention is appropriate. Saga pedo is biologically of such great interest that it has potential for research into breeding mechanisms and for display in collections of living invertebrates.

Hemiptera

The Hemiptera (s. lat.) have received relatively little attention from conservationists. In the UK the New Forest Cicada, Cicadetta montana (Homoptera), has been proposed for addition to the Wildlife and Countryside Act in the forthcoming quinquennial review, but this has not met with general approval. Although restricted in its UK distribution, it is generally considered to be safe from man-made disturbance. In Europe the species is much more widespread and not under threat. All cicadas are protected in West Germany.

The Heteroptera are considered in the west German Red Data Book, where 11 species are extinct, and over 30 species threatened (Blab et al., 1984). In Belgium three aquatic Heteroptera are under threat. Leclercq et al., 1980). In the UK 14 Heteroptera are endangered and 6 Vulnerable (Shirt, in press).

No species of Hemiptera are recommended for listing under the Bern Convention at the present time.

5.3. The Endopterygota

The nine orders of endopterygote insects include the largest and most successful groups:

Order	Candidates presented	No suitable candidates
21 Neuroptera		X
22 Coleoptera	X	
23 Strepsiptera		X
24 Mecoptera		X
25 Siphonaptera		X
26 Diptera		X
27 Lepidoptera	X	
28 Trichoptera		X
29 Hymenoptera	X	

Only three of these orders, the Coleoptera, Lepidoptera and Hymenoptera, include species currently recognized as suitable for the Bern Convention. Preliminary enquiries for candidates from the Neuroptera have met with no consensus. Various species appear in legislation and Red Data Books, but generally speaking they are of local concern. The neuropteran Ant-lions are protected in parts of Switzerland, Hungary, Czechoslovakia and parts of Austria, but in southern Europe they are commonplace. A number of other neuropterans are listed in West Germany (Blab et al., 1984), including Mantispa styriaca (Poda), an interesting species that is also rare in France and threatened in Austria (Gepp, 1983). The Mantispidae superficially resemble mantids in having raptorial front legs. The larvae of Mantispa attack the egg-cocoons of the wolf spider Lycosa and although the species is probably local in northern and central Europe, it is not believed to be widely threatened.

The endoparasitic Strepsiptera (stylopids) and ectoparasitic Siphonaptera (fleas) are not known to be of conservation concern. The Mecoptera (scorpion flies) is a small group with one species, Bittacus italicus (Müller) listed as extinct in West Germany (Blab *et al.*, 1984) and Endangered in Austria (Gepp, 1983) but otherwise not recognized as threatened. Austria lists three other threatened scorpion flies, but there is no evidence that this is a Europe-wide problem.

In general the Diptera are too difficult to identify to be considered for this round of additions to the Bern Appendices. Nevertheless, many species are listed in the various European Red Data Books discussed in this report and hundreds of species are threatened throughout Europe. A useful paper has been published on the threatened Finnish Diptera (Väisänen, 1982), which draws attention to the need for habitat protection coupled with individual protection of species shown to have suffered dramatic declines. In Finland, UK and probably most of Europe, modern forestry techniques have caused declines in Diptera, particularly of rotten-wood species and those species associated with deciduous trees (Väisänen, 1982; Stubbs, 1977). The Diptera will require a more thorough assessment on the European scale at a later date.

The Trichoptera (caddis-flies) have already suffered an extinction in Europe. Hydropsyche tobiasi, which was common in the River Rhine, has not been seen for over half a century (Wells, Pyle and Collins, 1983). Many other species of large rivers are under threat from pollution. Hydropsyche bulgaro-romanorum has suffered reductions but is still abundant in Hungary and Romania (Malicky, 1986). Various Setodes species, Rhyacophila pascoei and several Hydroptila species are similar in being species of large rivers and threatened in parts of their range, but safe elsewhere. Trichoptera can be useful indicators of pollution; the larvae of at least some species spin deformed food-catching webs in response to even mildly polluted waters. Some Trichoptera are restricted to small islands and mountain areas; most of these are not in much danger at present. However, the status of Agapetus quadratus on Corsica and Mallorca requires study. Its known localities have been destroyed, as have those of Hydropsyche discreta in Cyprus (Malicky, 1986). Chaetopteryx euganea is restricted to the tiny hill region near Padova, Italy, where there are many building developments. Anabolia lombardia from northern Italy and southern Switzerland is extinct from many places because of intensive agriculture, but still exists in parts of Switzerland. Apart from these few cases of problems in the Trichoptera, (kindly provided by H. Malicky) rather little is known or published about them from the conservation point of view. For this reason, and because they are rather difficult to identify in life, no species are presented for the Bern Appendices at this time.

Coleoptera

The beetles comprise the largest group of European insects and it is perhaps not surprising that the lists of threatened species are extremely lengthy. In the Red Data Book for West Germany alone, 4073 species from the total fauna of 5727 have been studied, and 1687 (41%) found to be threatened or potentially threatened (Blab *et al.*, 1984). In the UK 3900 species have been studied, of which 228 are threatened and 267 rare (total 13%) (Shirt, in press). Similar lists can be found in the Austrian Red Data Book (Gepp, 1983) and shorter ones in the USSR Red Data Book (Bannikov and Sokolov, 1984) and the Belgian report (Leclercq *et al.*, 1980). A large proportion of these listed species is concerned with locally rare species that are not

suitable for the Bern Convention. Clearly it has been impossible for the author to study the beetle fauna of Europe thoroughly, and to make a selection based on a thorough analysis. Instead, a list has been developed based on two particularly important beetle habitats, dead wood and freshwaters, and on a study of legislation and Red Data lists. In the case of dead wood and ancient woodland beetles, guidance has been taken from the studies done so far in the Council of Europe study of xylophagous beetles. To give just one example of the importance of trees, particularly deciduous species, to insects, in Sweden 80 per cent of the 130 endangered beetle species are known to be associated with deciduous trees (Ehnström, 1978).

For water beetles, the advice of the Balfour-Browne Club has been sought. This Club is devoted to the study of water beetles and has members throughout Europe. Two Dytiscidae, Dytiscus latissimus and Graphoderus bilineatus, are proposed for listing. The Gyrinidae (whirligigs) are generally agreed to be widely under threat, but are difficult to identify. Amongst the Hydrophilidae Spercheus emarginatus (Schaller) is a good candidate, but not included in this report. An inhabitant of stagnant water rich in nutrients, it is rare in central Europe and possibly extinct in Britain. The Great Silver Water-beetle Hydrophilus piceus (or, incorrectly, Hydrous piceus) is widely protected in Europe: Niederösterreich, Oberösterreich, Tirol and Vorarlberg in Austria, the Flemish region of Belgium, West Germany (as the genus), and Luxembourg (as the genus). An even more seriously threatened hydrophilid, although often overlooked by legislators and conservationists, is Hydrochara caraboides (L.), the Lesser Silver Water beetle. Unfortunately this is sometimes incorrectly called Hydrophilus caraboides L., adding to the confusion. It would be premature to list these species on the Bern Convention. The silver water beetles need careful checking to identify them and the muddle over the generic names is a disadvantage (G.N. Foster, in litt., 10 May 1986).

15. Calosoma sycophanta L., 1758 VULNERABLE

Phylum	ARTHROPODA	Class	INSECTA
Order	COLEOPTERA	Family	CARABIDAE

Common names Caterpillar searcher (En), Puppenräuber (Ge), Krajnik Pizmovy (Cz), Aranyos Babrablo (Hu), Liszkarz Tecznik (Po).
For Russian name see Bannikov and Sokolov, 1984.

Distribution

Western, southern and eastern Europe as far as the Caucasus, with a disjunct population in eastern USSR (Siberia) and perhaps Mongolia (Bannikov and Sokolov, 1984). Also known from North Africa (Tunisia, Algeria, Morocco), Asia Minor and North America (Horion, 1941).

Status in Europe

<u>Austria</u>	Endangered (Gepp, 1981; 1983).
<u>Belgium</u>	Endangered. Distribution now very severely reduced (Leclercq, 1971 <u>et seq.</u> , map 899; Leclercq <u>et al.</u> , 1980).
<u>Bulgaria</u>	Endangered (listed in law).
<u>Czechoslovakia</u>	Vulnerable (Novak and Spitzer, 1982). Protected by law. Occurs from the plains to the mountains, plentiful in places, particularly during caterpillar outbreaks (Caputa <u>et al.</u> , 1982).
<u>Denmark</u>	Indeterminate (Hansen <u>et al.</u> , 1960).
<u>Germany (FRG)</u>	Endangered (Anon., 1983; Anon., 1982; Blab <u>et al.</u> , 1984). All <u>Calosoma</u> species are protected by law of 19.12.86.
<u>Germany (GDR)</u>	Indeterminate.
<u>Hungary</u>	Endangered (listed in law).
<u>Italy</u>	Generally rare, but occasionally abundant where outbreaks of its prey occur (Casale <u>et al.</u> , 1982).
<u>Poland</u>	Vulnerable. Fully protected, but populations declining (Glowacinski <u>et al.</u> , 1980).
<u>Spain</u>	Not rare (Viedma, pers. comm.).
<u>Sweden</u>	Indeterminate (Hansen <u>et al.</u> , 1960).
<u>USSR</u>	Vulnerable (Bannikov and Sokolov, 1984).

Habitat and ecology

Adults and larvae climb trees where they prey on other insects; adults can also fly well. The adults are robustly built, blue-green in colour and 17.5-28 mm long. Larval period only a few weeks but adults live 2-4 years.

Has been introduced to N. America to combat caterpillar pests, notably Lymantria dispar. A rare species in western Europe, but more common in the south and east (Harde et al., 1984).

Reasons for decline

Few published details have been found concerning the serious decline of this species. Destruction of suitable woodland habitat is likely to be the main cause.

Conservation measures taken

The genus Calosoma is protected in the Czech region of Czechoslovakia, Luxembourg, Poland (Glowacinski et al., 1980), FRG, Saarland and Baden-Württemberg, three Austrian provinces and the Flemish region of Belgium. C. sycophanta is protected in Bulgaria, Hungary and three Austrian states other than those protecting the genus.

Conservation measures proposed

Research on the precise requirements and management of this beetle is needed. Europe-wide surveys coupled with a coordinated strategy to protect representative areas of critical habitat will be needed to prevent further decline. Amongst the species considered in this report, C. sycophanta has low priority for protection under the Bern Convention. In view of its value in biological control, Appendix III would be appropriate.

16. Carabus intricatus L., 1761 VULNERABLE

Phylum ARTHROPODA Class INSECTA

Order COLEOPTERA Family CARABIDAE

Common names Blue Ground Beetle (En), Lápos Kékfutrinka (Hu), Biegacz Karbowany (Po)

Distribution

Southern Europe, mainly south of the River Main. Details are provided by Horion (1941) and Breuning (1978).

Status in Europe

- Albania Indeterminate.
- Belgium Vulnerable. Range severely reduced, now confined to eastern Belgium (Leclercq, 1971 et seq., map 910).
- Bulgaria Indeterminate.
- Denmark Indeterminate. (Hansen et al., 1960).
- France Northern regions. Indeterminate.
- Germany (FRG) Vulnerable. Endangered in Schleswig-Holstein (Anon., 1982). All Carabus species are protected by law of 19.12.86.
- Germany (GDR) Indeterminate.
- Greece Indeterminate.
- Hungary Endangered (listed in law).
- Italy Indeterminate (Casale et al., 1982).
- Netherlands Indeterminate.
- Poland Indeterminate. Little is known of its status. (Glowacinski et al., 1980, Ferens et al., 1957).
- Rumania Indeterminate.
- Sweden Endangered (Hansen et al., 1960; Ehnström, 1985). Protected in Kristianstad (Skane).
- Switzerland Indeterminate.
- U.K. Endangered. A relict population in the extreme south-west (Shirt, in press).

Habitat and ecology

The dark blue adult beetles are large (24-36 mm) and can be found between

May and August in moist, mostly deciduous forests at moderate altitudes. Larvae feed in stumps and under the bark of old hardwood timber, where a thick humus layer is present (Shirt, in press).

Reasons for decline

Removal of old and dead hardwood timber. Destruction of ancient forests. This is possibly a very valuable indicator species, sufficiently widespread to be useful, but sensitive enough to respond to environmental damage.

Conservation measures taken

The whole family Carabidae is protected in the Swiss canton of Schaffhausen. The genus Carabus is protected in Poland (Glowacinski et al., 1980; Ferens, 1957), FRG, Saarland and Baden-Württemberg, Luxembourg, four Austrian provinces and the Flemish region of Belgium. C. intricatus is fully protected in Hungary, and in the Swedish province of Kristianstad (Skane).

Conservation measures proposed

Survey and study, followed by conservation of critical habitats throughout Europe. Of the species considered in this report, C. intricatus is one of the more marginal candidates for protection under Appendix II of the Bern Convention.

17. Carabus olympiae Sella, 1855

ENDANGERED

Phylum ARTHROPODA

Class

INSECTA

Order COLEOPTERA

Family

CARABIDAE

Common names None known

Distribution

Northern Italy (Casale et al., 1982). In recent years the beetle has been artificially introduced into the French Alps.

Status in Europe

France Artificially introduced into the Mercantour National Park and the Ecrins National Park.

Italy Endangered. Restricted to a very small area on the mountain of Moncerchio, at the head of the Val Sessera in Biella District, Vercelli Province.

Habitat and ecology

The habitat is on the northern slopes of Moncerchio in two biotopes, one dominated by elms (Ulmus), the other a moorland habitat with whortleberry (Vaccinium) and Rhododendron. Active at night, preying on snails, particularly Helicigona arbustorum. Adults emerge in spring to copulate in June. Larvae feed for 40 days then pupate in August, developing in the soil during the next two months and spending the winter in diapause in soil cells.

Reasons for decline

Carabus olympiae is probably a relict species from the warmer climates that preceded the Pleistocene glaciations. Its range is much reduced under present-day conditions. Since the 19th century it has been heavily collected because of its attractive appearance and large size, was believed extinct in 1928, but was rediscovered in 1942. Habitat destruction compounded the problem, mainly due to recreational developments. The threat of flooding due to construction of a dam in Val Sessera appears to have retreated for the time being.

Conservation measures taken

In recent years there has been considerable activity to conserve this beetle. In 1983 the Piedmont Regional President passed an act specifically to protect the beetle in Italy. The local naturalists' organization, Pro Natura Biellese, has published a fine book about the beetle (Malausea et al., 1983). Since 1975 a team of French scientists has been mass-rearing the beetle artificially, and artificial introductions have been made into Mercantour and Ecrins National Parks (Malausea, 1978). The progress of the released populations is being monitored. This beetle was the subject of an unanswered question to the European Parliament (Muntingh, 1983).

Conservation measures proposed

Continuing support by the French government of the rearing and introduction work is essential. A national park in the Val Sessera has been proposed since 1982, but no action has yet been taken by the Italian authorities apart from species legislation. Habitat protection is essential to the long-term survival of this, one of Europe's rarest and most beautiful beetles. Protection of this beetle under Appendix II of the Bern Convention is a high priority.

18. Dytiscus latissimus L., 1785

ENDANGERED

Phylum ARTHROPODA

Class INSECTA

Order COLEOPTERA

Family DYTISCIDAE

Common names The family is known as the Diving Beetles (En), Der Breitrand (Ge).

Distribution

Northern and central Europe and Siberia.

Status in Europe

Austria Endangered (Gepp, 1983).

Czechoslovakia No data.

France Very rare, possibly extinct. North-eastern areas.

Germany(FRG) Endangered (Blab et al., 1984). Very local and rare throughout Germany. In recent years recorded only in upper Bavaria, south of Munich, where it is endangered. Protected by law of 19.12.86.

Germany (GDR) No data.

Finland Quite common

Hungary Endangered.

Italy Not reliably recorded.

Poland Widely distributed, but rare everywhere.

Sweden Still present in northern Sweden at least.

Switzerland No data.

Habitat and ecology

A predatory diving beetle, one of eight large species occurring in Europe. D. latissimus is the largest and most distinct, being dark brown with yellow marginal stripes on expansions of the elytra. This species is usually recorded as living in large ponds, including fishing lakes, which is unusual as most dytiscines are eliminated by fish because their pelagic larvae are easy prey.

Reasons for decline

Formerly with a very wide distribution, but very rare since the last century; now in serious decline and absent from many places. Drainage of wetlands and intensive fish-stocking are the main reasons for decline. Pollution and other impacts on its freshwater habitats may also be implicated.

Conservation measures taken

Listed as endangered in West Germany (Blab et al., 1984) and in Austria (Gepp, 1983). Protected by law in Hungary and West Germany. The genus Dytiscus is protected in Oberösterreich, Austria.

Conservation measures proposed

This species is relatively easy to identify in the field and would benefit from protection under Appendix II of the Bern Convention. Such a listing would draw attention to the widespread loss of freshwater habitats throughout Europe.

For much of the information in this data-sheet I am grateful to Garth N. Foster and his correspondents in the Balfour-Browne Club (Foster, in litt., 4 June, 1986).

19. Graphoderus bilineatus (Degeer) ENDANGERED

Phylum	ARTHROPODA	Class	INSECTA
Order	COLEOPTERA	Family	DYTISCIDAE

Common names The family is known as the Diving Beetles (En), Der Breitrand (Ge).

Distribution

Central and Western Europe.

Status in Europe

<u>Austria</u>	Potentially threatened (Gepp, 1983).
<u>Denmark</u>	Considered endangered by Holmen (pers. comm. to G.N. Foster).
<u>France</u>	Possibly extinct (Bameul, Leblanc, pers. comm. to G.N. Foster).
<u>Germany (FRG)</u>	Endangered (Blab <u>et al.</u> , 1984).
<u>Germany (GDR)</u>	No data.
<u>Poland</u>	Recorded everywhere except in hills and mountains.
<u>Switzerland</u>	Recorded in Neuchatel in 1980. No data on status.
<u>UK</u>	Endangered, possibly extinct. Only ever found at Catfield Fen, east Norfolk. Detected in 1976 in a collection made there between 1904 and 1906 (Angus, 1976). Being easily recognisable, it would probably have been found if it was still present.

Habitat and ecology

One of a genus of smaller dytiscines, all beautifully marked in brown, black and yellow and all considered to be under some degree of threat in several countries. This species is easily distinguished from the rest by its pyriform shape, the others being broadest about the middle. A rather sedentary species, characteristic of smaller pools around large areas of open water. The larvae are pelagic and probably vulnerable to predation by fish, which perhaps they avoid by breeding in small pools subject to drying up, or very acid conditions. Like all Dytiscidae, exclusively carnivorous as larva and adult.

Reasons for decline

Adverse impacts on its freshwater habitats, including drainage and possibly fish-stocking or pollution.

Conservation measures taken

Listed as under threat in West Germany, Austria and UK.

Conservation measures proposed

Suitable for listing under Appendix II of the Bern Convention.

For much of the information in this data-sheet I am grateful to Garth N. Foster and his correspondents in the Balfour-Browne Club (Foster, in litt., 4 June, 1986).

20. <u>Osmoderma eremita</u> (Scopoli, 1763)		ENDANGERED	
Phylum	ARTHROPODA	Class	INSECTA
Order	COLEOPTERA	Family	SCARABAEIDAE
Common names	Hermit Beetle (En), Juchtenkäfer (Ge), Pachnik hnedy (Cz), Eremit (Ge). For Russian name see Bannikov and Sokolov, 1984.		

Distribution

Sporadically in the southern part of northern Europe, southern and central Europe (Paulian and Baraud, 1982); and almost to the Urals in western USSR (Bannikov and Sokolov, 1984). Detailed distribution is given by Freude, Harde and Lohse (1969) and Horion (1958).

Status in Europe

<u>Austria</u>	Endangered (Gepp, 1984).
<u>Belgium</u>	Endangered (Leclercq, 1971 <u>et seq.</u> , map 940), Recorded in Brabant, Limbourg and Liège (Baraud, 1977), but range now very seriously reduced.
<u>Czechoslovakia</u>	Indeterminate.
<u>Denmark</u>	Indeterminate. Sporadically occurring in several states.
<u>Finland</u>	Endangered. Sporadic occurrences only (Hansen <u>et al.</u> , 1960).
<u>France</u>	Indeterminate. Widespread but rare and localized in regions with ancient woodlands (Paulian and Baraud, 1982; Baraud, 1977).
<u>Germany (FRG)</u>	Endangered (Anon., 1982; Blab <u>et al.</u> , 1984). Protected by law of 19.12.86.
<u>Germany (GDR)</u>	Indeterminate.
<u>Greece</u>	Indeterminate.
<u>Hungary</u>	Endangered.
<u>Italy</u>	Indeterminate. Northern and central regions to Campania. Also Sicily.
<u>Liechtenstein</u>	Protected by law, and presumably under serious threat (Anon., 1933).
<u>Netherlands</u>	Indeterminate.
<u>Norway</u>	Indeterminate, possibly Endangered. Sporadic occurrences in the south (Hansen <u>et al.</u> , 1960). Last recorded in 1975 and listed as a threatened species of Norwegian forests (Kvamme and Hagvar, 1985).

<u>Poland</u>	Indeterminate (Novak and Spitzer, 1982).
<u>Spain</u>	Indeterminate. Recorded from the Pyrenees, Barcelona and Gerona; very rare (Baraud, 1977).
<u>Sweden</u>	Endangered (Ehnström, 1985). Sporadic occurrences only (Hansen <u>et al.</u> , 1960).
<u>Switzerland</u>	Indeterminate (Allenspach, 1970).
<u>USSR</u>	Vulnerable (Bannikov and Sokolov, 1984).
<u>Yugoslavia</u>	Indeterminate.

Habitat and ecology

Adults can be found on flowers between June and September. Very localized. Adults supposedly smell like Russian leather (Harde et al., 1984). Larvae live in the wood mould of old deciduous trees; development takes several years. The form, size and colouring of this beetle make it quite unmistakable. It is 24-30 mm long, heavily built with powerful legs, black all over.

Reasons for decline

In common with so many other beetles that depend on dead or moribund trees for the development of their larvae, Osmoderma eremita has suffered from destruction or intensive management of ancient woodlands for greater economic advantage. It is now in serious decline throughout much of Europe.

Conservation measures taken

The species Osmoderma eremita is protected in Liechtenstein, FRG, Saarland and Baden-Württemberg, the Flemish region of Belgium, and Hungary.

Conservation measures proposed

Another of the xylophagous beetles listed by the Council of Europe's Group of Consultants for Invertebrates for a Europe-wide survey. Although it is abundantly clear that the Hermit Beetle is under threat throughout much of its range, the survey will pin-point vital areas of critical habitat for long-term protection and more appropriate management. Osmoderma eremita is of widespread concern and is a high priority for listing on Appendix II of the Bern Convention.

21. Buprestis splendens F., 1767

ENDANGERED

Phylum ARTHROPODA

Class INSECTA

Order COLEOPTERA

Family BUPRESTIDAE

Common names Goldstreifiger Prachtkäfer (Ge)

Distribution

Sporadically occurring over much of Europe, including boreal regions, but not France, Italy or the Mediterranean islands, and no further east than the Caucasus and Urals (Cobos, 1986). Formerly believed to be restricted to central and northern Europe, but recent records in Greece, Albania and Spain have extended its known range. A useful map is given by Cobos (1953).

Status in Europe

Albania Recently recorded; status unknown (Mühle, 1981).

Austria Endangered or Extinct (Gepp, 1984). Extinct in Steiermark (Gepp, 1981).

Denmark Uncertain records (Hansen et al., 1960).

Finland Very rare (Hansen et al., 1960).

Germany (FRG) Extinct (Blab et al., 1984). Should it be rediscovered, it is already protected by law of 19.12.86.

Greece Recently recorded; status unknown (Mühle, 1981).

Spain Extremely rare (A. Cobos pers. comm. to M. G. de Viedma). Three specimens recorded (Cobos, 1953, 1986).

Sweden Uncertain records (Hansen et al., 1960), probably extinct (Ehnström, 1985).

Habitat and ecology

Early stages are unknown, but feed in dead wood. At least in Spain B. splendens exclusively attacks indigenous pine trees (Pinus sylvestris L., P. pinea L., P. nigra laricia Poir. etc.) (Cobos, 1986). Despite its superb appearance, the beetle is cryptic and hard to find.

Reasons for decline

Loss of woodland, perhaps particularly ancient pine forests. Dead wood is essential for breeding. Further data are needed on this rather enigmatic and disruptively distributed species.

Conservation measures taken

All buprestids (jewel beetles) are protected in FRG, Saarland and Baden-Württemberg. No other measures are known.

Conservation measures proposed

Buprestis splendens is one of the species of xylophagous, ancient woodland, beetles proposed for a Europe-wide survey to be organized and compiled by the Council's Group of Consultants for Invertebrates, with the help of national experts. This survey will prepare the baseline survey data that are vital to a long-term conservation and management plan. Preservation of relict ancient woodlands will undoubtedly be central to such a plan. Due to a lack of precise published data, Buprestis splendens is not of the highest priority for protection under the Bern Convention, but Appendix II is appropriate.

22. Cucujus cinnaberinus (Scopoli, 1763) ENDANGERED

Phylum	ARTHROPODA	Class	INSECTA
Order	COLEOPTERA	Family	CUCUJIDAE

Common names Scharlachkäfer (Ge), Lesak rumelkovy (Cz)

Distribution

A rare species found mostly in northern Europe and sporadically in central Europe (Bavaria, Slovakia and elsewhere) (Harde et al., 1984; Horion, 1960).

Status in Europe

Austria Endangered/Vulnerable (Gepp, 1981; 1983).

Czechoslovakia Indeterminate (Novak and Spitzer, 1982).

Finland Vulnerable (Hansen et al., 1960); listed in the Red Data Book. Threatened by modern forestry 'hygiene' (Väisanen, 1982).

Germany (FRG) Endangered (Blab et al., 1984).

Germany (GDR) Indeterminate (no data).

Norway Vulnerable. Known only from one locality in the south-east (Kvamme and Hagvar, 1985).

Sweden Endangered (Ehnström, 1985); protected by law in Uppsala province (Uppland).

Habitat and ecology

An exceptional cucujid in being large (11-15 mm) and brightly coloured (red-brown). Lives under the decaying bark of deciduous trees, mainly elm, oak, beech, and sometimes conifers (Harde et al., 1984).

Reasons for decline

Despite being a large and easily recognizable species, its cryptic habits make its precise status uncertain. Nevertheless, its evident decline over a wide area of northern and central Europe may be attributed to loss of suitable woodland habitats. In particular, modern forestry techniques have led to the loss of suitable rotten wood habitats in many parts of Europe.

Conservation measures taken

No practical conservation measures have been taken, although the species is listed in a number of Red Data Books, and protected in Uppsala, Sweden.

Conservation measures proposed

Coordinated survey work coupled with a thorough analysis of ecological requirements will enable planners and managers to preserve critical habitat of this species. Although listed as endangered, more data are required. C. cinnaberinus is of medium priority for listing under the Bern Convention.

23. Cerambyx cerdo L., 1758

ENDANGERED

Phylum ARTHROPODA

Class INSECTA

Order COLEOPTERA

Family CERAMBYCIDAE

Common names Heldbock, Grosser Eichenbock (Ge), Capricorne (Fr), Kozka Deboz (Po), Tesarik Obrovsky (Cz), Nagy Hoscincér (Hu), Koziorog Bukowiec (Po). For Russian name see Bannikov and Sokolov, 1984.

Distribution

Once widely distributed in Europe but now retreating eastwards very rapidly. Rare in most parts of central Europe (Harde et al., 1984) and in USSR, where it is found only in the western segment, approximately as far as Moscow (Bannikov and Sokolov, 1984). Also known from North Africa and Asia Minor as far as northern Iran (Villiers, 1978), and probably including Turkey. Further details of distribution are given by Horion (1974).

Status in Europe

Austria Endangered (Gepp, 1981; 1983).

Czechoslovakia Endangered. Protected by law. Distribution in Horion (1974). Rare in the Czech region, somewhat more common in Slovakia (Caputa et al., 1982).

France Indeterminate (Villiers, 1978).

Germany (FRG) Endangered (Anon., 1983; Anon., 1982; Blab et al., 1984). Protected by law of 19.12.86.

Hungary Endangered (listed in law).

Poland Endangered. Habitat and populations in decline despite legal protection (Glowacinski et al., 1980; Ferens, 1957).

Spain Not uncommon (Viedma, pers. comm.).

Sweden Endangered (Horion, 1974; Hansen et al., 1960; Ehnström, 1985). Protected in Oland province (Kalmar).

Switzerland Indeterminate. Recorded from rather few localities (Allenspach, 1973).

Turkey Indeterminate (records need to be checked).

UK Recorded as extinct by Harde et al. (1984), but the only records are for Pleistocene sub-fossils in bog oaks. Specimens still occasionally appear in southern England, but they are not believed to be breeding.

Habitat and ecology

This is one of Europe's largest insects, adults being 24-53 mm long, with even longer antennae. Adults are active between May and August, mainly in the evenings and at night on the trunks of old oaks (rarely other trees). Larvae develop for 3-5 years in oak, where they penetrate to the heart-wood, rendering it useless as timber. They can reach 8 cm in length and bore galleries 2 cm in diameter (Ferens, 1957).

Reasons for decline

Cerambyx cerdo has been systematically destroyed by foresters because of the damage the larvae do to living oak trees. Now the species is insignificant as a pest, any economic considerations being far out-weighed by aesthetic value and conservation needs. Species such as Cerambyx cerdo, with slow-developing larval stages, require ancient woodland habitat where moribund trees and dead wood are left to die and decay at a natural pace. Current forestry trends towards fast-growing timber trees and excessive forest 'hygiene' have mitigated against the survival of this superb beetle and led to its dramatic decline.

Conservation measures taken

The genus Cerambyx (with three European species) is protected in two Austrian provinces. Cerambyx cerdo is protected in three other Austrian provinces, in the Czech region of Czechoslovakia, FRG, Saarland and Baden-Württemberg, Hungary, Poland (Glowacinski et al., 1980) and in the Swedish area of Oland in the province of Kalmar (law of 29 July 1965, replacing that of 20 June, 1918).

Conservation measures proposed

Cerambyx cerdo is one of the species of xylophagous, ancient woodland, beetles proposed for a Europe-wide survey to be organized and compiled by the Council's Group of Consultants for Invertebrates with the help of national experts. This survey will prepare the baseline distributional data that are vital to a long-term conservation and management plan. Preservation of relict ancient woodlands will be central to such a plan. Since the only specimens known from U.K. are sub-fossil, it would be unreasonable to invoke conservation measures in that country. Nevertheless, Cerambyx cerdo is a high priority for protection on Appendix II of the Bern Convention.

24. Morimus funereus Mulsant, 1863

ENDANGERED

Phylum ARTHROPODA

Class INSECTA

Order COLEOPTERA

Family CERAMBYCIDAE

Common names Gyaszcincer (Hu). For Russian name see Bannikov and Sokolov, 1984.

Distribution

A southern European species found sporadically in central Europe (Czechoslovakia and formerly Austria) (Harde et al., 1984). Absent from France (Villiers, 1978) and doubtful in Germany (Horion, 1974). Reaches into western USSR (Bannikov and Sokolov, 1984). Further details of distribution are given by Horion (1974).

Status in Europe

Austria Extinct (Gepp, 1983).

Belgium Indeterminate (Leclercq, 1971).

Czechoslovakia Indeterminate. Occurs sporadically.

Hungary Endangered (listed in law).

USSR Endangered (Bannikov and Sokolov, 1984).

Habitat and ecology

Larvae feed on dead wood of a number of tree species, including Populus, Fagus, Quercus, Castanea and occasionally Abies (Demelt, 1966). Adults found in May and June on tree stumps, trunks and old wood (Harde et al., 1984). A handsome species, robustly built, 20-38 mm long, grey-black with black spots on the elytra.

Reasons for decline

This is another species of ancient woodlands, requiring a natural community of forest trees in various stages of growth and decay. Destruction and management of such woodlands for greater economic returns have caused a steady decline.

Conservation measures taken

Protected by law in Hungary (January 1982).

Conservation measures proposed

The Council's Group of Consultants for Invertebrates includes Morimus funereus on its list of species to be surveyed and monitored throughout Europe. Well-planned conservation measures will develop from this initiative in due course. Morimus funereus is suitable for protection on Appendix II of the Bern Convention.

25. Rosalia alpina (L., 1758)

ENDANGERED

Phylum ARTHROPODA

Class INSECTA

Order COLEOPTERA

Family CERAMBYCIDAE

Common names Alpenbock (Ge), Havasi Cincér (Hu), Nadobnica Alpejska or Nabodnica Kamiennik (Po), Tesarik Alpsky (Cz). For Russian name see Bannikov and Sokolov, 1984

Distribution

Historical range includes western and central Europe across into USSR, but its distribution is rapidly shrinking. Detailed distributional data are provided by Horion (1974).

Status in Europe

Austria Endangered.

Belgium Presence uncertain.

Bulgaria Endangered (listed in law).

Czechoslovakia Endangered. Protected by law. Has become very rare in the Czech region and Moravia due to destruction of beech woods. More abundant in some parts of Slovakia, especially in mountainous areas from 600-1000m (Caputa et al., 1982).

Denmark Indeterminate (absent according to Hansen et al., 1960).

France Indeterminate (Villiers, 1978). Said to be common in some mountainous areas and recently found in Corsica (Villiers, 1978).

Germany (FRG) Endangered (Blab et al., 1984). Listed in Bavaria, Württemberg (Anon., 1983). Protected by law of 19.12.86.

Germany (GDR) Indeterminate.

Greece Protected by law, and presumably under serious threat.

Hungary Endangered (listed in law).

Liechtenstein Protected by law, and presumably endangered (Anon., 1933).

Netherlands Indeterminate.

Poland Endangered. Habitat and populations in serious decline despite legal protection (Glowacinski et al., 1980; Ferens, 1957).

Portugal Indeterminate.

Spain Vulnerable and much sought-after by collectors (M.G. de Viedma, pers. comm.).

<u>Sweden</u>	Recorded from southern regions only (Hansen <u>et al.</u> , 1960). Possibly now extinct (Ehnström, 1985).
<u>Switzerland</u>	Indeterminate. Widespread, but localized (Allenspach, 1973).
<u>USSR</u>	Rare. (Bannikov and Sokolov, 1982). Occurs in the Caucasus and south-west USSR around the Black Sea.

Habitat and ecology

From June to September the beetles can be seen in the daytime on standing or felled beech (Fagus) trees; sometimes on flowers. Larvae develop in the wood of diseased beeches, but occasionally also in other deciduous trees, such as maples (Harde et al., 1984). A very attractive beetle with a distinctive light blue pubescence over a large part of its body and very long antennae.

Reasons for decline

Destruction of good breeding habitat, particularly old beech forests, is to blame for the loss of this species from large tracts of Europe. Although beech woodlands are still fairly extensive, forestry practice and management for economic returns mitigate against the survival of the beetle in the rotten and diseased wood that the larvae prefer. The singular beauty of the species also attracts collectors, who may easily capture this rather docile insect (Ferens, 1957). Whether this has any serious impact on the beetle's populations remains uncertain.

Conservation measures taken

In Austria the genus Rosalia is probably protected in two provinces, while R. alpina is believed to be protected in five others. The species is also protected in Czechoslovakia, FRG, Saarland and Baden-Württemberg, Bulgaria, Hungary, Liechtenstein and Greece.

Conservation measures proposed

Listed for distributional survey and monitoring by the Council of Europe's Group of Consultants for Invertebrates. Detailed data accruing from that project will give a sound basis for protection of a network of critical habitats throughout Europe. Rosalia alpina is a high priority for protection on Appendix II of the Bern Convention.

Lepidoptera

Far more information is available for butterflies (Rhopalocera) than for moths (Heterocera). The butterflies have been well-served by the Heath (1981b) report, which examined the status of all the European species. The 15 endangered species in the Heath report were examined as primary candidates for the Bern Convention, and reduced by deletion of those species which have a wide range outside Europe. One species not recognised at the time of the Heath report has been added in the endangered category, Maculinea rebeli. This was formerly believed to be a subspecies of M. alcon but is now widely accepted as a distinct species. Erebia christi, a narrowly distributed species of particular concern in Switzerland, is listed as vulnerable.

The Apollo butterfly (Parnassius apollo) was given lengthy consideration before being rejected as a candidate for the Appendices to the Convention. The Apollo is listed as rare in the most recent assessment (Collins and Morris, 1985) but even this category was acknowledged as possibly being unjustified. The threats to the Apollo have been exaggerated because of the excessive subdivision into subspecies. Although some forms are very restricted in their range, the Apollo as a species is certainly not threatened. Its distribution reaches over to eastern Asia, and in parts of Europe (the Pyrenees, for example) it is a common sight. Apollo populations will remain, by and large, protected by the ruggedness of their habitat.

The Red Data Books and other lists that include threatened butterflies are too numerous to discuss in any detail here. References to the literature will be found in Table 1.

Moths have received very little attention on the European scale. Hundreds of species are listed in the West German Red Data Book and elsewhere, but no synthesis has ever been attempted. For this reason it has been difficult to recommend a few species for the Bern Convention. The final list of five species is far from satisfactory and there is a particular need for more detailed research in this sphere. A rather spectacular eastern European emperor moth, Eudia spini (D. & S., 1775), is cause for concern but has not been given a full data-sheet due to lack of information. It seems to be an inhabitant of the steppes, particularly in Asia Minor, but has retreated from Austria, GDR, Czechoslovakia, Hungary, Romania and the USSR and may even be extinct in some countries. Its decline has been mainly during the past 30 years and the precise reasons remain unclear (A. Schintlmeister in litt., 13 April 1986). Most of the countries within its range are not party to the Bern Convention.

26. Papilio hospiton Guenée, 1839

ENDANGERED

Phylum ARTHROPODA

Class

INSECTA

Order LEPIDOPTERA

Family

PAPILIONIDAE

Common names Corsican Swallowtail (En), Korsicher Schwalbenschwanz (Ge),
Port-Queu de Corse (Fr)

Distribution

Corsica (to France) and Sardinia (to Italy)

Status in Europe

Corsica Endangered, protected by French law.

Sardinia Insufficiently known.

Recognized as Endangered in Council of Europe Report (Heath, 1981b), and the IUCN Red Data Book (Collins and Morris, 1985). Noted as a seriously threatened species by Bernardi (1979). Proposed for CITES Appendix I.

Habitat and ecology

Mountain habitats from 600 m to 1500 m altitude. Breeding sites extremely localized. Foodplants are Umbelliferae, either Foeniculum vulgare, Foeniculum (Ferula) communis or Peucedanum paniculatum. On the wing May until August.

Reasons for decline

Habitat destruction, commercial collecting, destruction of foodplants by burning (poisonous to sheep). Leisure developments on Corsica.

Conservation measures taken

Legislation in France, but not Italy. No protection of habitat. Much of central and western Corsica is a Regional Park (Duffey, 1982), but the distribution of P. hospiton in the park remains unknown. Gennargentu National Park has been proposed in eastern Sardinia, but the presence of the butterfly needs to be confirmed.

Conservation measures proposed

Surveys of populations, designation of protected areas, ecological studies and management plans. Despite legislation in France and protected areas on Corsica, measures to conserve this species have been inadequate so far. Specific efforts to protect and manage the best breeding localities of P. hospiton are required. This species is a high priority for protection on Appendix II of the Bern Convention; it is both well known and under severe threat.

27. Lycaena dispar (Haworth, 1803) ENDANGERED

Phylum	ARTHROPODA	Class	INSECTA
Order	LEPIDOPTERA	Family	LYCAENIDAE

Common names Large Copper (En), Flussampfer-Dukatenfalter, Grosser Feuerfalter (Ge), Lycène Disparate (Fr), Czerwонецzyk Plomieniec (Po), Ohnivacek Cernocarny (Cz)

Distribution

Western Europe across USSR to Amurland. Nominate subspecies extinct in U.K. (but re-introduced - see below), still in northern Netherlands (Friesland), where it is usually regarded as a separate subspecies batava (Higgins and Riley, 1980). L. d. rutila occurs in France (local in Haute Marne, Aube, Alsace, Nièvre and Côte d'Or, Gironde etc.), Belgium, Germany (widely distributed near Berlin and northwards to southern Finland), Czechoslovakia, Poland and Hungary, Romania, Balkans (especially near the River Save), Bulgaria and Greece. Still found in marshy places in northern Italy, formerly occurred near Rome (Higgins and Riley, 1980).

Status in Europe

<u>Austria</u>	Endangered in Steiermark (Gepp, 1981).
<u>Belgium</u>	Indeterminate. Range in decline (Leclercq, 1971 <u>et seq.</u> , map 975). Protected in the Flemish region.
<u>Bulgaria</u>	Recorded as a rarity (Nestorova and Slivov, 1985).
<u>Czechoslovakia</u>	Recently extinct (Heath, 1981b), or threatened with extinction (Novak and Spitzer, 1982).
<u>Denmark</u>	Extinct.
<u>Finland</u>	Endangered and protected by law since 1983 (Väisänen <u>et al.</u> , 1983). Five other species of Lepidoptera are already extinct in Finland (Mikkola, 1981).
<u>France</u>	Vulnerable. Protected by law of 22.8.1979. Subspecies <u>gronieri</u> Bernardi extinct since 1908 (Bernardi, 1963).
<u>Germany (FRG)</u>	Endangered (Blab <u>et al.</u> , 1981); extinct in Bavaria (Anon., 1983). Protected by law of 19.12.86.
<u>Germany (GDR)</u>	Vulnerable.
<u>Greece</u>	Endangered; only one locality known.
<u>Hungary</u>	Threatened. Subspecies <u>hungarica</u> Szabo, 1956, protected by law (Fazekas, 1983) since January 1982.
<u>Italy</u>	Declining.
<u>Luxembourg</u>	Endangered (Meyer and Pelles, 1982).

<u>Netherlands</u>	Endangered; protected by law. Confined to a few protected localities. The local form is subspecies <u>batavus</u> Oberthür (see Bink, 1972).
<u>Poland</u>	Vulnerable (Dabrowski and Krzywicki, 1982). Threatened by drainage, grassland improvement and afforestation (Palik, 1981).
<u>Switzerland</u>	Endangered; possibly extinct.
<u>United Kingdom</u>	Extinct since 1851. Subspecies <u>batavus</u> Oberthür protected as an introduction in Woodwalton Fen National Nature Reserve (Duffey, 1968, 1977).
<u>USSR -</u>	
<u>Lithuania SSR</u>	Rare (Heath, 1981b).

Habitat and ecology

Marshes, fens, damp meadows and wet ditches; sea level to about 1000 m. Foodplants are docks, especially Rumex hydrolapathum, R. crispus and R. aquaticus; also Polygonum and rarely Iris.

Reasons for decline

Drainage of wetlands; flooding of valleys for reservoirs; vegetational successions in some nature reserves. For details see Duffey (1968, 1977) and Väisänen et al., 1983). In the Netherlands some former sites became unsuitable through vegetational succession and land reclamation.

Conservation measures taken

Protected by law in Finland (1983) France (females only), FRG, Saarland and Baden-Württemberg, Netherlands, Hungary and the Flemish region of Belgium. Present in nature reserves in Austria, Netherlands and U.K.

Conservation measures proposed

Establishment of properly managed nature reserves. National conservation organizations must recognize that management for birds and plants is not always conducive to survival of butterflies. In the Netherlands some former sites could be restored by suitable management for the butterfly. Expert guidance should be encouraged, developed and utilized. L. dispar is a high priority for protection on Appendix II of the Bern Convention, even though it already benefits from extensive legislation in Europe.

28. Maculinea teleius (Bergsträsser, 1779)

ENDANGERED

Phylum ARTHROPODA

Class

INSECTA

Order LEPIDOPTERA

Family

LYCAENIDAE

Common names Scarce Large Blue (En), Grosser Moorbläuling (Ge), Modraszek Lakowy Jasny (Po)

Distribution

France through central Europe to Asia and Japan. Very local in central Europe to 53°N (Berlin). France, chiefly in north-east Savoie, Isere; Switzerland not south of Rhône Valley. Italy, in southern foothills of Alps from Susa to Carniola. Absent from Romania and the Balkans (Higgins and Riley, 1980).

Status in Europe

Austria Vulnerable (Gepp, 1983); Endangered in Steiermark (Gepp, 1981).

Belgium Vulnerable (Leclercq et al., 1980). Protected in the Flemish region.

Czechoslovakia Endangered.

France Endangered. Females of the subspecies burdigalensis Stempffer) are protected by law.

Germany (FRG) Local; Vulnerable in Bavaria (Anon., 1983).

Germany (GDR) Vulnerable (Heath, 1981b).

Hungary Vulnerable. Many local populations (Heath, 1981b).

Italy Endangered. One colony only, threatened by wetland drainage (Heath, 1981b).

Netherlands Extinct since 1971, but possibly seen in 1985.

Poland Vulnerable (Dabrowsky and Krzywicki, 1982). Threatened by drainage, grassland improvement etc. (Palik, 1981).

Spain Rare (De Viedma and Gomez Bustillo, 1976, 1985).

Switzerland Endangered. Very few localities (Heath, 1981b).

Yugoslavia Endangered (Heath, 1981b).

Listed as Vulnerable in the IUCN Invertebrate Red Data Book (Wells, Pyle and Collins, 1983), but recently re-categorized as Endangered.

Habitat and ecology

Inhabits marshy meadows up to 2000 m altitude. Adults feed and oviposit on Sanguisorba officinalis and later lives in nests of Myrmica, probably M. scabrinodis. Adults also take nectar from Vicia cracca (Thomas, 1984). Adults fly in July.

Reasons for decline

Land drainage, fertilizer application, river impoundment. All known sites in the Rhône Valley were destroyed in 1981 when a large reservoir was constructed.

Conservation measures taken

One subspecies protected by French law (females only). Also protected in the Flemish region of Belgium. Present in Austria in a nature reserve (Heath, 1981b).

Conservation measures proposed

Surveys of populations, designation of protected areas, ecological studies and management plans, surveys of Asian distribution. M. teleius is a high priority for protection on Appendix II of the Bern Convention, being threatened throughout its European range.

29. Maculinea nausithous (Bergstrasser, 1779) ENDANGERED

Phylum	ARTHROPODA	Class	INSECTA
Order	LEPIDOPTERA	Family	LYCAENIDAE

Common names Dusky Large Blue (En), Schwarzblauer Moorbläuling (Ge),
Modraszek Lakowy Ciemny (Po)

Distribution

Very local in central Europe to 52°N. Northern Spain (isolated colony near Soria), France (chiefly in north-east, Colmar, Ain, Sère, Netherlands, northern Switzerland (Weesen, Berne); more widely distributed in Bavaria and central Germany, Austria, Czechoslovakia, Hungary, Poland, Yugoslavia, to the Urals and Caucasus in USSR

Status in Europe

Austria Vulnerable; Endangered in Steiermark (Gepp, 1981) and Salzburg (Gepp, 1983).

Bulgaria Recorded as a rarity (Nestorova and Slivov, 1985).

Czechoslovakia Endangered (Heath, 1981b).

France Endangered due to land use change and reservoir construction. Protection urgently needed (Heath, 1981b).

Germany (FRG) Rare and local; Vulnerable in Bavaria (Anon. 1983); Endangered in Nordrhein-Westfalen (LOLF, 1979). Protected by law of 19.12.86.

Germany (GDR) Vulnerable (Heath, 1981b).

Hungary Endangered. Extinct in some areas (Heath, 1981b). Protected by law.

Netherlands Extinct since 1972 (Heath, 1981b).

Poland Vulnerable (Dabrowski and Krzywicki, 1982). Threatened by drainage, grassland improvement etc. (Palik, 1981).

Spain Rare (but not listed by De Viedma and Gomez Bustillo, 1976; see Manley and Allcard, 1970).

Switzerland Endangered. Very few localities, but at least one is in a protected area (Heath, 1981b).

USSR Common in Caucasus; rare and local in Ukraine (Heath, 1981b).

Yugoslavia Endangered (Heath, 1981b).

IUCN Red Data Book: Endangered (Wells, Pyle and Collins, 1983).

Habitat and ecology

Marshy meadows, frequently near lakes. Adults feed and oviposit on Sanguisorba officinalis; later stage caterpillars inhabit ants' nests (Myrmica rubra). Flies in July.

Reasons for decline

Land drainage, fertilizer application, flooding of valleys. All known sites in Rhône Valley were destroyed in 1981 when a large reservoir was constructed. Losses also occur from sites that appear superficially unchanged, perhaps as a result of impacts on the ant host, Myrmica rubra (Thomas, 1984).

Conservation measures taken

Heath's (1981b) record of this species being protected in Switzerland is erroneous. Protected by law in Hungary since January 1982. In the Netherlands attempts are being made to reintroduce both M. teleius and M. nausithous. Some good sites with foodplants plus ant hosts still exist, others are being restored.

Conservation measures proposed

Establishment of reserves in suitable sites very urgent; essential to maintain water table. Minimal management by cutting may be required (Thomas, 1984). M. nausithous is very widely and severely threatened, and is a high priority for protection on Appendix II of the Bern Convention.

30. Maculinea rebeli Hirschke, 1904

VULNERABLE

Phylum ARTHROPODA

Class INSECTA

Order LEPIDOPTERA

Family LYCAENIDAE

Common names Rebel's Large Blue (En), Rebels Enzianbläuling (Ge)

Distribution

Southern and central Europe, chiefly from mountainous areas, but at lower altitudes in France. Once considered to be a subspecies of M. alcon, but now recognised as a separate species with different ecological requirements.

Status in Europe

Belgium Former localities have not been recently assessed.

Denmark Very local (Higgins and Riley, 1980).

France Especially in the Massif Central and the south-eastern Alps.

Germany (FRG) Known from the Lauda area. Protected by law of 19.12.86.

Italy Apennine localities.

Spain Eastern Pyrenees, and from a few localities near Soria, Teruel and Santander (Higgins and Riley, 1980).

Switzerland Threatened in the Jura and other lower, lush montane areas where pastures are fertilised and cut.

Habitat and ecology

The habitat is meadows and grass slopes at 1200-1800m, sometimes at lower altitudes in France, often in dry localities (Higgins and Riley, 1980). Eggs are laid on gentians, either Gentiana germanica or G. cruciata. Life cycle depends upon parasitism of colonies of the ant Myrmica schenki (J. Thomas pers. comm.). This ant is fairly scarce in Europe, but only a small number of nests is needed to support a colony of M. rebeli because the caterpillars are fed directly by worker ants, and a single nest can produce over 20 butterflies (J. Thomas pers. comm.). Adults fly at the end of June and into July.

Reasons for decline

The ant and foodplants depend upon a low-productivity grazing system now in decline. Abandonment of pastures and the resulting spread of shrubs and trees, or enrichment of pastures using fertilizers results in the loss of these species and consequently loss of the butterfly. Indeed, both Gentiana cruciata and G. germanica are threatened plants in Europe. Although not quite as seriously threatened as M. teleius or M. nausithous, M. rebeli is nevertheless in a serious decline and is in need of conservation action.

Conservation measures taken

None known.

Conservation measures proposed

Careful studies of life history, distribution and ecological requirements. Appropriate management of prime localities. Listing on Appendix II of the Bern Convention.

31. Coenonympha oedippus F., 1787

ENDANGERED

Phylum ARTHROPODA

Class

INSECTA

Order LEPIDOPTERA Family

SATYRIDAE

Common names False Ringlet (En), Moor Wiesenvögelchen (Ge)

Distribution

France, Belgium, Italy, Germany, Austria, Hungary through USSR to China and Japan.

Status in Europe

Austria Endangered; habitat in Vorarlberg has been destroyed (Gepp, 1981; 1983).

Belgium Endangered; possibly extinct (Leclercq 1971 et seq. map 394).

France Endangered. Some subspecies extinct; protected by law of 22 August 1979 (Burton, 1980).

Germany (FRG) Endangered (Blab et al., 1981); extinct in Bavaria (Anon., 1983). Protected by law of 19.12.86.

Hungary Endangered and protected by law (Fazekas, 1983) since January 1982.

Italy Endangered (Heath, 1981b).

Lichtenstein Site at Fürstenturm has been destroyed (Heath, 1981b).

Poland Vulnerable (Dabrowski and Krzywicki, 1982). Known only from one locality in the Bialowieza forest. Floods caused its disappearance for many years, but there is still hope that it will be rediscovered (Palik, 1981).

Spain Endangered (De Viedma and Gomez Bustillo, 1976; Manley and Allcard, 1970)

Switzerland Endangered; now confined to one locality. Extinct in the south (Heath, 1981b).

Habitat and ecology

Wet lowland Molinia meadows. Foodplants are Lolium, Carex and Iris pseudacorus.

Reasons for decline

Land drainage and grassland improvement (Palik, 1981); conversion for rice cultivation (Pô Valley).

Conservation measures taken

Protected by law in France (females only), Hungary, FRG, Saarland and Baden-Württemberg. In Austria it is protected in the Kotlies nature reserve.

Conservation measures proposed

Establishment of properly managed nature reserves is a most urgent necessity. C. oedippus is a high priority for protection on Appendix II of the Bern Convention; it is threatened throughout its European range.

32. Erebia christi Rätzer, 1890 VULNERABLE

Phylum ARTHROPODA Class INSECTA

Order LEPIDOPTERA Family SATYRIDAE

Common names Rätzer's Ringlet (En)

Distribution

Confined to the Alps in southern Switzerland (Simplon Pass, Laggintal, Alpien, Hossaz Alp, Zwischbergental, Eggen) and northern Italy. Colonies very restricted (Higgins and Riley, 1980)

Status in Europe

Italy Endangered/Vulnerable. A very few scattered colonies in Simplon and Val Formazza.

Switzerland Endangered/Vulnerable. A few colonies in the Laggintal area.

Habitat and ecology

Alpine meadows of 1500-2000 m. Foodplant for the caterpillar is probably Festuca ovina. Flies end of June and July. One generation per year; caterpillar overwinters August to May (Rappaz, 1979).

Reasons for decline

There is considerable concern that over-collecting may be causing a decline in this species, but such fears are probably unjustified in view of the rugged mountain-top localities of the colonies. Perhaps of more serious concern, there are proposals for a dam and reservoir on the river Laggina, somewhere in the Laggintal Valley. Depending on its size, this could have serious consequences for the Erebia. An access road is already under construction.

Conservation measures taken

The Laggintal area is a prime butterfly site exploited heavily by collectors. The authorities of the Swiss canton of Valais have initiated proceedings to protect this butterfly some time ago, but they were initially opposed by the local community, who were said to be afraid of losing the revenue brought in by the numerous entomological visitors. The Ligue Suisse pour la Protection de la Nature, very concerned about the status of Erebia christi, continued to press for protective measures. In response, the Canton of Valais passed a Regulation in 1985, forbidding the carrying of nets and collecting of butterflies anywhere in the Laggintal Valley.

Conservation measures proposed

Protection of E. christi from a perceived threat of over-collecting may be insufficient to ensure the safety of the species. The evidence that over-collecting has been a serious threat is not at all convincing; apparently collectors can only collect from a narrow path and are dependant upon adults flying their way. Mapping and monitoring would be useful for a species as restricted as this one, and would enable the authorities to carry

out a much-needed ecological and conservation evaluation of the threats to the habitat of the species. The status of E. christi remains somewhat uncertain and although the species would undoubtedly benefit from the attention that protection under Appendix II of the Bern Convention would bring, this is not of the highest priority. Italian and Swiss authorities should be consulted.

33. Hypodryas maturna (L. 1758) ENDANGERED
 (= Euphydryas maturna)
- | | | | |
|--------|-------------|--------|-------------|
| Phylum | ARTHROPODA | Class | INSECTA |
| Order | LEPIDOPTERA | Family | NYMPHALIDAE |
- Common names Scarce Fritillary (En), Kleiner Maivogel (Ge),
 Hnedasek osikovy (Cz), Przeplatka Maturna (Po),
 Diszes Tarkalepke/(Hu). For Russian see Caputa et al., 1982.

Distribution

Europe north of the Alps, including France, Germany, Austria, southern Fennoscandia, Hungary and Rumania, through the USSR to the Altai mountains.

Status in Europe

- | | |
|-----------------------|--|
| <u>Austria</u> | Endangered or Vulnerable; Endangered in Steiermark (Gepp, 1983). |
| <u>Belgium</u> | Very restricted and declining, possibly Endangered (Leclercq 1971 <u>et seq.</u> , map 563). |
| <u>Czechoslovakia</u> | Endangered. Only present in virgin wetland forests (Novak and Spitzer, 1982). Protected in the Slovak republic (Klemm, 1985, Tassi, 1969). Survives in a small number of forest-steppe habitats, where it is never numerous (Caputa <u>et al.</u> , 1982). |
| <u>Finland</u> | <i>Present.</i> |
| <u>France</u> | Endangered. Protection urgently needed. Threatened by changes in forestry management. Present distribution requires examination (Heath, 1981b). |
| <u>Germany (FRG)</u> | Endangered (Blab <u>et al.</u> , 1981; Blab and Kudrna, 1982). Extinct in north-west; very local and endangered in Bavaria (Anon., 1983). Protected by law of 19.12.86. |
| <u>Germany (GDR)</u> | Vulnerable (Heath, 1981b). |
| <u>Luxembourg</u> | Endangered; present status uncertain (Meyer and Pelles, 1982). |
| <u>Poland</u> | Vulnerable (Dabrowski and Krzywicki, 1982). Threatened by drainage of wetlands, grassland improvement, afforestation, grazing and burning (Palik, 1981). |
| <u>Sweden</u> | Vulnerable. Considerable decline; now mainly confined to north-east Uppland. Threatened by conversion of hardwood forests to conifer and drainage of wetlands followed by afforestation (Heath, 1981b). |
| <u>USSR</u> | Rare in Lithuania SSR (Heath, 1981b). |

Habitat and ecology

Wetland areas in deciduous forests. Foodplants include Fraxinus, Populus, Fagus and, after overwintering, Plantago, Scabiosa, Veronica etc.

Reasons for decline

Drainage of wetlands followed by afforestation.

Conservation measures taken

Protection under discussion in France.

Conservation measures proposed

Establishment of nature reserves to protect this species is of the utmost importance. Such reserves must be managed in such a way as to maintain the wetland conditions. H. maturna is a high priority for protection on Appendix II of the Bern Convention; the species is well known, and severely threatened throughout its range.

34. Eriogaster catax (L.)

ENDANGERED

Phylum ARTHROPODA

Class

INSECTA

Order LEPIDOPTERA

Family

LASIOCAMPIDAE

Common names Heckenwollafter (Ge)

Distribution

At one time probably widespread in Europe, but now confined to central Europe and relicts in far-flung corners. A detailed map is given by Heath and Leclercq (1981). Strongest populations in Austria, Czechoslovakia and Hungary.

Status in Europe

Austria

Endangered (Gepp, 1983). Protected in two states.

Belgium

Endangered. In serious decline and now very rare (Leclercq, 1971 et seq., map 781).

Bulgaria

Indeterminate. Scattered records only.

Germany (FRG)

Endangered (Blab et al., 1984). Very few records. Protected by law of 19.12.86.

Hungary

Endangered (listed in law).

Italy

Occasional records prior to 1950, none in recent years (Heath and Leclercq, 1981).

Luxembourg

Extinct (Meyer and Pelles, 1982).

Netherlands

Indeterminate. A single post-1950 locality (Heath and Leclercq, 1981).

Spain

Very rare in north-central areas (Gomez Bustillo et al., 1974).

Switzerland

Probably occurred here at some time, but no recent records.

Yugoslavia

Indeterminate. Only in the north, on the Hungarian border.

Habitat and ecology

Until July the caterpillars inhabit a common web on blackthorn, hawthorn (Crataegus), oak (Quercus), poplar (Populus) and birch (Betulus) (Seitz, 1913), also Berberis vulgaris (Lhomme, 1923-35).

Reasons for decline

Like its congener, E. lanestris, E. catax has probably suffered a serious decline through destruction of hedgerows, agricultural spraying, and possibly pollution of hedgerows by cars. More information needed, but said to be in decline everywhere.

Conservation measures taken

Protected in Hungary by law of January 1982. All Lasiocampidae are protected in two Austrian provinces, FRG, Saarland and Baden-Württemberg.

Conservation measures proposed

Although this species does seem to be severely threatened, there are few published data on the precise cause of its decline, or indeed its ecological requirements. Protection of key habitat is essential if eventual extinction is to be avoided. Listing on Appendix II of the Bern Convention is appropriate.

35. Phyllodesma ilicifolia (L., 1758)

VULNERABLE

Phylum ARTHROPODA

Class INSECTA

Order LEPIDOPTERA

Family LASIOCAMPIDAE

Common names Small Lappet moth

Distribution

Central and northern Europe, and the colder parts of Asia as far as the Amur and Japan.

Status in Europe

Belgium Some records. No data on status.

Czechoslovakia No data.

Denmark Present in Jutland but extinct elsewhere.

Finland Rather widespread in the south.

France Some records. No data on status.

Germany (FRG) Endangered (Blab et al., 1984). Protected by law of 19.12.86.

Germany (GDR) Endangered (A. Schintlmeister in litt., 13 April, 1986.). Has become very local in the past 30 years due to changes in agricultural practice, especially drainage.

Poland No data.

Romania Rare.

Sweden Rather widespread in the south.

United Kingdom Extinct since c. 1900.

USSR No data.

More data are needed on the past and present distribution of this species.

Habitat and ecology

An inhabitant of heather moors, peat-bogs and open formation forests with abundant bilberry (Vaccinium myrtillus). The caterpillars live on bilberry, willows (Salix), aspens (Populus) and oaks (Quercus), over-wintering in the pupal stage. Emergence is early, April-May and possibly earlier in some parts of its range.

Reasons for decline

This species has declined rapidly during this century. Said to be already extinct as a resident by 1900 in the UK, endangered in FRG and GDR. Its decline is presumably the result of intensification and expansion of agriculture, particularly where this has involved drainage. There is no evidence that air pollution has played a role, but this should not be discounted.

Conservation measures taken

Listed in Red Data Books in UK and FRG. No substantial measures known.

Conservation measures proposed

Conservation of suitable moorland and peat-bog habitat would seem to be fundamental to preserving this species. Basic data on life-cycle, distribution and reasons for decline are needed. Meanwhile, this species is suitable for the Bern Convention Appendix II, drawing attention to threatened acid wetland biotopes.

36. Graellsia isabelae (Graells, 1849)

VULNERABLE

Phylum ARTHROPODA

Class INSECTA

Order LEPIDOPTERA

Family SATURNIIDAE

Common names Spanish Moon Moth (En), L'Isabelle (Fr), Isabellaspinner (Ge)

Distribution

Southern France and northern and eastern Spain.

Status in Europe

France Restricted to small localities in the French Alps. Reported to be heavily collected, despite being protected by French law.

Germany (FRG) Not known to breed in Germany, but protected by law of 19.12.86.

Spain Vulnerable (De Viedma and Gomez Bustillo, 1976). Sierra del Guadarrama, Montes Universales, Sierra de Cazorla y Segura, Barcelona, Gerona, Lérida, Huesca and Navarra. Mainly north and east of Madrid (De Viedma and Gomez Bustillo, 1976, 1985).

Habitat and ecology

In areas of Pinus sylvestris L. and P. nigra laricius Poiret, particularly between 800 and 1200 metres, but also lower down. Feeds on a variety of conifers in captivity. A single generation emerges in May and June, overwintering in the pupal stage. Adults strongly phototropic. Males fly strongly over long distances in search of females. Caterpillars feed in pine trees and pupate in the ground beneath. Artificial rearing is possible and introductions into suitable habitats in France have been proposed (Dumon, 1975/76).

Reasons for decline

Massive commercialization has been a cause for great concern, although in certain areas it seems to have caused the species to spread by human agency. The French subspecies has been severely hunted over the past 30 years or so. This moth flies strongly to lights and can be taken in great numbers in this very destructive way. Between 1960 and 1970 the forest habitats of this species in Spain were the subject of massive spraying of DDT and other pesticides for control of Thaumetopoea pytiocampa (Pine Processionary moth), but the programme has now been relaxed.

Conservation measures taken

Protected by law in France as well as in five communes in particular (Bourgogne, 1975/76). Listed in the Spanish Red Data Book (De Viedma and Gomez Bustillo, 1976, 1985) and portrayed in a leaflet and on a poster of "Mariposas Necesitan Proteccion" by the Forest Service of Madrid (Viedma et al., 1980). The species is used as an emblem of Spanish entomology, particularly of the forest fauna. Its large size, green coloration and superb tailed wings are quite unmistakable.

Conservation measures proposed

Following the recommendations of the Spanish experts, in whose country this species mainly flies, total protection in all states should be invoked as soon as possible. An assessment of the protection of suitable habitat must be made and critical areas conserved. Bona fide commercial exploitation may be allowed, but controlled and monitored under licence. Collectors requiring single specimens also need not be discouraged, but collection of long series for personal use, or for part-time trading, needs to be prevented, particularly where it involves indiscriminate use of light traps. G. isabelae need not be of the highest priority for protection under the Bern Convention, partly because of conflicting reports of its status, but also because the Spanish authorities are in a position to undertake all necessary measures at the national level. Nevertheless, Graellsia isabelae is very suitable for listing under Appendix III of the Convention.

37. Hyles hippophaes (Esper, 1789) VULNERABLE
(= Celerio hippophaes)

Phylum	ARTHROPODA	Class	INSECTA
Order	LEPIDOPTERA	Family	SPHINGIDAE

Common names None known

Distribution

Spain northwards to Baden in southern Germany, and from there eastwards to central Asia (northern Syria, Iran, Kashmir, Samarkand, Transcaspiian region, Xinjiang and Mongolia) (Newman, 1965; Rothschild and Jordan, 1903; Pittaway, 1983).

Status in Europe and elsewhere

<u>France</u>	Rare. Mainly south-eastern regions (Lhomme, 1923-35).
<u>Germany (FRG)</u>	Not listed by Blab <i>et al.</i> (1984). All species of <u>Hyles</u> are protected by law of 19.12.86.
<u>Greece</u>	Recorded from the Aegean islands.
<u>Iran</u>	Northern regions.
<u>Mongolia</u>	Recorded, but no data on status.
<u>Rumania</u>	Recorded, but no data on status.
<u>Spain</u>	Rare. North-eastern regions, only two known localities (M.G. de Viedma, <i>in litt.</i> , 27 May 1986). Not listed in the Spanish Red Data Books (De Viedma and Gomez Bustillo (1976, 1985).
<u>Switzerland</u>	Probably rare.
<u>Turkey</u>	Recorded in the west, but no data on status.
<u>Yugoslavia</u>	Northern regions.
<u>USSR</u>	In southern regions.

Habitat and ecology

Eggs are laid on the leaves of sea buckthorn (Hippophae rhamnoides). Caterpillars pupate in a flimsy web among debris on the ground beneath the food plant: the adult is an attractive hawk-moth with pointed, predominantly brown wings, but with grey and red markings.

Reasons for decline

This moth is certainly rare throughout the western part of its range, but data are lacking for the eastern sector. Western populations are disjunct (see map in Pittaway, 1983). Precise reasons for the rarity of this moth are obscure. Its foodplant is mainly coastal in Europe, but the distribution of the moth clearly indicates that either the plant survives well inland in Asia or the moth has alternative foodplants.

Conservation measures taken

None known as yet.

Conservation measures proposed

Many more data are needed on this species. Although it may benefit greatly from protection of individuals and habitat under Appendix II of the Bern Convention, more information should be sought from local experts. The cause of its retreat must be ascertained before proper conservation measures may be proposed.

38. Proserpinus proserpina (Pallas, 1772) VULNERABLE

Phylum	ARTHROPODA	Class	INSECTA
Order	LEPIDOPTERA	Family	SPHINGIDAE

Common names None known

Distribution

Central and southern Europe to the Transcaspian region, Lebanon and northern Iran, Morocco (Pittaway, 1983).

Status in Europe and elsewhere

<u>Austria</u>	Endangered, extinct in some places (Gepp, 1983).
<u>Belgium</u>	A few records from the extreme south (Leclercq, 1971 <u>et seq.</u> , map 597).
<u>Bulgaria</u>	No data.
<u>France</u>	Southern and central regions.
<u>Germany (FRG)</u>	Endangered (Blab <u>et al.</u> , 1984). Central and southern regions. Protected by law of 19.12.86.
<u>Greece</u>	No data.
<u>Hungary</u>	Endangered. Listed in law.
<u>Iran</u>	No data.
<u>Italy</u>	Including Sicily.
<u>Morocco</u>	No data.
<u>Portugal</u>	No data.
<u>Spain</u>	Rare, but more widely distributed than <u>H. hippophaes</u> (M.G. de Viedma, <u>in litt.</u> , 27 May 1986). Not listed in the Spanish Red Data Books (De Viedma and Gomez Bustillo (1976, 1985).
<u>Switzerland</u>	No data.
<u>Turkey</u>	No data.
<u>USSR</u>	Uzbekistan.

Habitat and ecology

This is a distinctive hawk-moth with pointed, ragged wings with grey and green bands. It flies in May-June, visiting flowers of willow-herb (Epilobium sp.), evening primrose (Oenothera) and bugloss (Echium sp.) after dark to take nectar. Eggs and caterpillars are chiefly on willow-herb, evening primrose and loosestrife. Pupates at shallow depth in ground, overwintering in this state.

Reasons for decline

A rare species that has disappeared entirely in many places in recent years. Now occurs very locally. Little known of the reasons for the evident decline of this species.

Conservation measures taken

Protected in Hungary by law of January 1982. All Sphingidae are protected in FRG, Saarland and Baden-Württemberg, Luxembourg, two Swiss cantons and three Austrian provinces.

Conservation measures proposed

Data on the status of this moth in European states are needed. Although widespread, it may be on the decline everywhere. Again, habitat protection and proper management will be needed to ensure its survival. P. proserpina is suitable for protection under Appendix II of the Bern Convention.

Hymenoptera

The literature on the conservation of the Hymenoptera is patchy, both taxonomically and geographically. In the UK an introductory booklet on conservation of bees and wasps (Else et al. 1979) and an atlas of bumblebees (Bombus, Psithyrus) (Int. Bee Res. Assoc. et al., 1980) have been published. B. cullumanus and B. pomorum, are probably extinct in UK. In the USSR 14 species of Bombus, including B. pomorum, are listed as vulnerable (Bannikov and Sokolov, 1984). Bombus pomorum may be widely threatened in Europe, but as yet there are few supporting data. As well as the 14 Bombus species, ten other Hymenoptera are listed, one of which, Xyllocopa violacea, is also listed in West Germany (Blab et al., 1984). The Austrian (Gepp, 1983), Belgian (Leclercq et al., 1980) and West German (Blab et al., 1984) Red Data Books include large numbers of Hymenoptera, with some species in common, but there is insufficient consensus to propose species for the Bern Convention. A thorough study similar to that done for Rhopalocera and Odonata would undoubtedly reveal a number of solitary and social wasps and bees that are under threat through their range.

The Formicidae (ants) is one family of Hymenoptera that has received closer attention. The IUCN/SSC Ant Specialist Group has made some preliminary progress in listing threatened ants in Europe. A 1979 document listed European species of which one, Epimyrma ravouxi, was described in some detail in Wells, Pyle and Collins (1983). E. ravouxi is a slavemaker ant and as such would be expected to have low populations. Its European range is extensive, but sparsely distributed, and it is classified as rare. It is not known to be under serious threat and is therefore not recommended for the Bern Convention. Other candidates include two Formica species, transcaucasica and truncorum, both of which are listed as endangered in West Germany (Blab et al., 1984). The former, the Black Bog ant, is restricted to peat bogs and moist heathlands, both widely threatened habitats in Europe. Formica transcaucasica is listed as needing conservation attention in south-eastern Norway (Kvamme and Hagvar, 1985). Formica truncorum is a boreal species common in Scandinavian countries but rare and vulnerable in central Europe, where its distribution is disjunct (A. Mabelis, pers. comm.). Europe-wide enquiries about these species might lead to their listing as candidates for the Bern Convention, but data presently to hand are insufficient.

The Wood Ants (Formica rufa and allies) were described in some detail in the IUCN Invertebrate Red Data Book (Wells, Pyle and Collins, 1983). They were classified as vulnerable because of widespread evidence of decline, despite still being relatively abundant. The large and obvious nests have attracted the attention of the public and Wood Ants are protected in a number of European countries. Whilst not seriously threatened, they may still be suitable for listing under the Bern Convention as insects that are well known and declining throughout Europe.

39.	<u>Formica rufa</u> L.	VULNERABLE
40.	<u>Formica aquilonia</u> Yarrow	VULNERABLE
41.	<u>Formica lugubris</u> Zetterstedt	VULNERABLE
42.	<u>Formica polyctena</u> Förster	VULNERABLE
43.	<u>Formica pratensis</u> Retzius	VULNERABLE

Phylum	ARTHROPODA	Class	INSECTA
Order	HYMENOPTERA	Family	FORMICIDAE

Common names Formica rufa: Red Wood Ant (En), Mravenec Lesni (Cz), Mrowka Rudnica (Po), Erdei Vöröshangya (Hu), Rote Waldameise (Ge).
Formica aquilonia: Alpenwaldameise (Ge)
Formica lugubris: Gebirgs-Waldameise (Ge)
Formica polyctena: Kahlrückige Waldameise (Ge)

Distribution

The European Wood Ants include five closely related species distributed in Northern and central Europe, the Caucasus, Siberia and North America.

Status in Europe

<u>Austria</u>	No data.
<u>Belgium</u>	Declining (Leclercq et al., 1980).
<u>Czechoslovakia</u>	Vulnerable (Novak and Spitzer, 1982). Protected by law. According to Caputa et al. (1982) still plentiful in mountainous areas with sloping conifer forests.
<u>France</u>	No data.
<u>Germany (FRG)</u>	Vulnerable and declining (Blab et al., 1984). Protected by law of 19.12.86.
<u>Germany (GDR)</u>	No data.
<u>Italy</u>	Declining. Protected in many areas.
<u>Luxembourg</u>	Declining.
<u>Poland</u>	Declining (Szczepanski, undated).
<u>Spain</u>	No data.
<u>Switzerland</u>	Declining. Protected by law in all cantons.
<u>United Kingdom</u>	Not severely threatened.
<u>USSR</u>	Not listed in the USSR Red Data Book.

Habitat and ecology

Characterization of the individual species is not easy. The nests usually consist of large mounds of pine needles, twigs, moss and other debris built above the subterranean living chamber. All species feed on insects and on aphid honeydew. See Wells, Pyle and Collins (1983) for further information.

Reasons for decline

Wood Ants, although not as yet seriously threatened, are in decline in many parts of their range. Large-scale disturbances usually involve urban expansion and pressure, land use change and forest exploitation. Acid rain is also suspected to be harmful to these ants although evidence of a direct impact is lacking. Dense conifer plantations are unsuitable for Wood Ants, although the forest edges may be acceptable, if left undisturbed. Irreparable damage to nest structures is frequent, either through collecting for fish or bird food, or out of curiosity, or simply as an act of vandalism.

Conservation measures taken

Protected in Switzerland (all cantons); the Italian areas of Piemonte, Lombardia, Bolzano, Trento and Venezia, Federal Republic of Germany and Czechoslovakia. Much research has been done on Wood Ants, particularly concerning their role as natural controllers of defoliators in forests. Practical measures to protect Wood ant nests have been taken in Switzerland and elsewhere (Collins and Thomas, 1985). Listed in the Red Data Books of Belgium, Luxembourg and Switzerland.

Conservation measures proposed

Research on the effects of acid rain is needed. Management studies and programmes are a requirement for conservation of Wood Ants, particularly in forests utilised for timber production. Educational measures are needed since the Wood ant nests are vulnerable to damage caused out of ignorance. As early as 1964 the Council of Europe encouraged its members to protect their Wood Ants from damage or destruction; listing on the Bern Convention would enable the campaign to be renewed. Listing on Appendix III is appropriate, enabling the exploitation of Wood Ants for biological control purposes. Parties to the Convention should co-operate in a survey of the precise distribution of Wood Ants in Europe.

Since the Wood Ants are still quite widespread and by no means amongst the most seriously threatened of Europe's insects, they may be considered unsuitable for listing on the Convention. However, Wood Ants are already widely protected and listed in Europe, giving an opportunity for the Bern Convention Parties to encourage a unified effort to conserve the ants and their habitats throughout Europe.

6. ARTHROPODA - ARACHNIDA

The conservation status of the arthropod subphylum Chelicerata (horseshoe crabs, spiders and sea-spiders) is poorly known, but concern has been expressed for spiders in certain parts of Europe. In Great Britain, where draft proposals for a Red Data Book to include spiders has been drawn up, 35 species are endangered, 38 vulnerable, 37 rare and 4 extinct (A.E. Stubbs in litt.). In West Germany 17 species of Araneae are extinct, 23 species endangered, 60 vulnerable and 14 potentially threatened (Blab et al., 1984). Five Opiliones (harvestmen) are also listed.

Eresus niger (Eresidae), the male of which has a black-spotted red abdomen and superficially resembles a ladybird, is a rarity throughout northern Europe as far as Denmark (Jones, 1983). It is a species of warm heath habitats (south-facing slopes in northern Europe), where it builds a vertical tube in the ground, roofed by a small, silk web. It was believed extinct in UK for 74 years, but was rediscovered in 1980. Eresus niger is protected by law in the UK and Switzerland and listed as endangered in West Germany. No detailed reports on its wider distribution in Europe have been traced, but it is likely that in southern European countries Eresus niger is much more abundant. There is some suggestion that the northern and southern populations may be taxonomically distinct. If this did prove to be the case, the northern population would certainly merit protection. For the present it is not proposed as a candidate for the Convention, but the situation of Eresus niger requires careful monitoring.

The genus Dolomedes, with the two European species, fimbriatus and plantarius, is unusual in that it frequents marshes and fens, where it moves on the water surface feeding mainly on insects but adding the occasional small fish to its diet. The females are large, up to 22 mm in length. D. fimbriatus is rather widespread and sometimes common in Europe, but D. plantarius is more restricted. For this reason it is proposed as a suitable candidate for the Bern Convention.

The genus Macrothele includes two European species. One of them, M. calpeiana from southern Spain, is Europe's largest spider and has a restricted distribution. For these reasons it is worthy of consideration for the Bern Convention and is described in greater detail below. Its European congener, M. cretica, is confined to Crete, possibly only the western half of the island. Research and study of this species may reveal its potential as a candidate for the Convention, but data are too few at present. If M. cretica proves to be a species of the mountains it may be safe, but if it inhabits the lowlands it may be under some degree of threat.

44. Macrothele calpeiana (Walck.)

VULNERABLE

Phylum ARTHROPODA

Class ARACHNIDA

Order ARANEAE

Family DIPLURIDAE

Common names None known

Distribution Southern Spain (Cadiz, Malaga), Morocco.

Status in Europe

Spain Indeterminate. Distribution not precisely known, but apparently restricted to the provinces of Cadiz and Malaga, most commonly in the hills between Tarifa and Ronda.

The recent records from Morocco give no indication of status or habitat.

Habitat and ecology

Europe's largest spider, with recorded body lengths reaching 35 mm and a reputation for aggression, backed up by a painful bite. The nearest relatives are M. cretica in Crete, and five species in central Africa. Little was known of its distribution or biology until very recent studies by Snazell (1986). The spider was most commonly found in oak woods (predominantly the bark oak Quercus suber L.) in the hills between Tarifa and Ronda, where rainfall of 800-2000 mm is high for such a southerly position. M. calpeiana lives opportunistically in pre-existing holes and crevices, sometimes forming large and dense colonies.

Reasons for decline

With the absence of historical distributional data it is difficult to assert that this species has declined. Nevertheless, it is virtually absent from agricultural land and pine plantations, its optimum habitat being undisturbed oak woodland. This implies that its range would have been greater in the past, when oak woods were more extensive. Nevertheless, M. calpeiana is at present fairly secure, with large areas of woodland still intact. The major threat is development of the woodlands for higher production. This involves clearing of underbrush with bulldozers, removal of stones and re-seeding of the ground layer for grazing. This capital-intensive operation is at present not widespread. Housing developments are spreading, causing local damage, particularly along the coast between Tarifa and Algeciras, but they are, as yet, few in number.

Conservation measures taken

None known specifically for the spider. There are four protected areas in the region. They are: Sierrania de Ronda National Reserve (219,600 ha), Cortes de la Frontera National Reserve (12,342 ha), Ronda el Burgo Public Game Reserve and Siera de Grazelema Nature Park (47,120 ha). The second of these is most likely to include habitat at a suitable altitude, the other three are marginal to the spider's presently known range.

Conservation measures proposed

Although in no immediate danger, this spider might be susceptible to any widespread changes in land use in southern Spain and it would benefit from the attention of conservationists. Listing on Appendix II of the Bern Convention is proposed, partly as a way to attract further research and study. Its distribution within local protected areas requires examination, perhaps with proposals for new protected sites in areas where the spider is common.

The information in this data-sheet is derived almost entirely from the work of Snazell (1986).

45. Dolomedes plantarius (Clerck) VULNERABLE

Phylum ARTHROPODA Class ARACHNIDA

Order ARANEAE Family ASAURIDAE

Common names Great Raft Spider, Marsh Spider (En)

Distribution

Widespread in northern Europe, but very localised (Bonnet, 1930).

Status in Europe

Austria Southern and eastern regions.

Czechoslovakia Southern and eastern regions.

Denmark Several localities on Fyn and Sjaelland.

France Scattered records, mainly in the south-west and particularly along the Garonne river.

Germany (FRG) Endangered. Scattered records. Listed in Red Data Book (Blab et al., 1984). Protected by law.

Germany (GDR) Scattered records.

Hungary Scattered records.

Italy Northern districts only.

Poland Recorded in the extreme south-west.

Romania Scattered records.

Sweden Southern tip of mainland, plus Gotland.

Switzerland Endangered. Very few records

United Kingdom Endangered. Britain's largest and rarest spider. Now only found on Redgrave Fen, on the River Waveney, Suffolk. This is a nature reserve, managed by the Suffolk Trust for Nature Conservation. Known from Neolithic remains in the Somerset levels.

USSR Scattered and widespread records from Latvia, Lithuania and east to the Urals, the Crimea and the Caucasus.

Yugoslavia Few records, north only.

The above data are taken almost exclusively from the distribution map provided by Bonnet in 1930. There are very few recent records and more data are urgently required.

Habitat and Ecology

Fens and marshes with dense vegetation. Feeds on insects trapped on the surface of the water; occasionally even on small fish. Capable of gliding across the surface of the water, and, when suprised, of hauling itself down the stems of reeds to escape underwater. Three to four years may be required for maturation in the north, less in the south. Sometimes abundant at certain juvenile stages, but a small proportion survives to adulthood. Adults nearly always uncommon in their localities.

Reasons for decline

Drainage of fens and marshes; industrial pollution. The species only survived in Redgrave Fen, UK, because ancient peat diggings allowed pools to persist when water levels dropped through drainage. Few data from continental Europe, but there is good reason to suspect widespread loss of habitat. Industrial pollution of slow-moving or standing waters in the Rhône Valley and elsewhere needs to be examined.

Conservation measures taken

Protected by law in UK and Switzerland. Now protected in Redgrave Fen, UK, by a system of weirs that maintains water levels.

Conservation measures proposed

Surveys of present distribution are urgently needed; data are lacking. Listing on Appendix II of the Bern Convention would draw valuable attention to the situation of this species, and would serve to assist in the preservation of wetlands generally. Dolomedes inhabits small, vegetated fens and marshes that would perhaps be overlooked as significant vertebrate habitat.

7. ARTHROPODA - CRUSTACEA

The Crustacea comprise an important part of many freshwater and marine communities in Europe but, with the exception of freshwater crayfish and some marine decapods (see section 10), their conservation status is generally poorly known. Non-marine species with restricted ranges and narrow endemics may well be threatened by habitat loss and pollution, but at present data are not available. Documentation of these species is urgently required - there is already a suggestion that some freshwater crustaceans may be declining in Belgium as a result of acid rain (Wouters in litt., 10.2.83).

The status of Isopoda (woodlice) in Britain and Ireland has been assessed (Harding, 1985), and a number of species are listed as threatened. Nevertheless, the compiler acknowledges that distributional data are inadequate to be confident of conservation needs, and no species are recommended for listing on the Bern Convention at this time.

The freshwater crayfish, a group that is important both ecologically and economically, are the only species for for which reasonable data is available. They are food for large carnivorous fish including many commercial fish and as grazers (as well as scavengers) play an important role in clearing waterways of vegetation. The total catch of crayfish in Europe exceeded 100 million individuals valued at over US\$25 million in 1982. Demand is still growing, hence the increasing interest in developing crayfish fisheries and in aquaculture.

The crayfish plague, caused by a fungus, Aphanomyces astaci, which is endemic in North America, has had a disastrous impact on European indigenous crayfish. The disease first appeared in Europe in Italy in the 1860s, probably through the introduction of American crayfish for food, and had spread throughout much of the region by the early 1900s. Most recently it has reached the UK, with a disastrous effect on the native species (Marren, 1986). The plague's natural hosts, the Signal Crayfish Pacifastacus leniusculus and related species, are much more resistant to it than the European species. Given time, European species might develop resistance to the plague, but this is unlikely since they are also under pressure due to their vulnerability to pollution of the waterways by industrial effluent and runoff from farmland.

Because of the decline in native stocks the import of exotics resistant to the crayfish plague has become a major business. At least 20 countries have imported exotic species for the commercial market, including Astacus leptodactylus from Turkey and Orconectes limosus and Pacifastacus leniusculus from the US. P. leniusculus is an ideal species to farm for food but as it is a major carrier of the plague considerable controversy has arisen over its use. The Simontorps Akvatishka Avels-Labatorium is an industrial hatchery in Sweden which produces some half a million juvenile crayfish a year for export within Europe. They claim that their stock is free from a disease but this is currently being questioned. Furthermore, some introduced species seem to be more resistant to pollution than native species, and may progressively replace the latter throughout their range.

Two species of crayfish, Astacus astacus and Austropotamobius pallipes are recommended for listing under the Bern Convention, but other crayfish are also threatened. Astacus torrentium is a montane species, found in at least Switzerland, FRG, Hungary and France and widely considered to be under threat. Astacus leptodactylus occurs in Turkey and eastern Europe. At present it does not suffer from the plague and is exported in large numbers to western Europe for food. It is feared that it may contract the plague and be devastated. The species is protected in Poland. In the USSR Red Data Book two crayfish are listed, Pontastacus pylzovi and Astacus colchicus, both from the Caucasus region (Bannikov and Sokolov, 1984).

46. Astacus astacus (L., 1758) VULNERABLE

Phylum ARTHROPODA Class CRUSTACEA

Order DECAPODA Family ASTACIDAE

Common names Noble Crayfish (En), Edelkrebs (Ge)

Distribution

Scattered but widespread in northern Europe from France, Netherlands, Belgium, Switzerland (introduced), FRG, Austria, northern Italy (introduced), Cyprus (introduced), Yugoslavia, Czechoslovakia, Poland, Hungary, Bulgaria, Romania and USSR northwards to Scandinavia.

Status in Europe

- Austria Threatened in Steiermark by pollution, plague (Aphanomyces) and introduction of Orconectes limosus, an exotic crayfish.
- Belgium Threatened; very rare and limited to the Wallone region.
- Bulgaria Declining as a result of pollution and habitat disturbance.
- Cyprus Introduced for aquaculture purposes.
- Czechoslovakia Reported to be very rare. All three native crayfish are proposed for complete protection.
- Denmark The only native crayfish. Distribution seriously affected by pollution in rivers and lakes.
- Finland The only native crayfish, occurs in lakes throughout the west and up to 65°N. Introduced to rivers flowing into the Bothnian Bay. Declined severely in the '60s due to plague, pollution, dam construction and dredging (of 74 major watercourses where it was found only 20 have been unaffected by the plague).
- France All populations introduced, except north-eastern.
- Germany (FRG) Endangered (Blab et al; 1984). Protected by law.
- Hungary Abundant in most of the country until the 1860s, but plague decimated the stocks. Now confined mainly to the highland regions of the north-west. The last 20 years have seen a dramatic decrease due to drainage, pollution and the plague.
- Italy Northern districts (introduced). Fishing regulated in Bolzano.
- Luxembourg Extinct. Formally occurred in many small rivers, but believed extirpated by crayfish plague.
- Netherlands Central areas; declining due to deteriorating environmental factors and the spread of crayfish plague. Severity of threat not currently known.

<u>Norway</u>	Found in the south and south-west, presumably introduced or immigrated from Sweden. Probably affected by acid rain and overfishing. Local extinctions have been recorded.
<u>Poland</u>	Used to occur; populations undergone a serious decline, possibly due to introductions including <u>Orconectes limosus</u> and <u>Astacus leptodactylus</u> .
<u>Romania</u>	No data.
<u>Spain</u>	Was introduced, but died out.
<u>Sweden</u>	South and Baltic coast area. Populations seriously affected by acidification of lakes.
<u>Switzerland</u>	Introduced; found mainly in the northeast, may be abundant in some lakes, but has disappeared from some localities.
<u>United Kingdom</u>	Reported to have been introduced, but no recent records.
<u>USSR</u>	Reported in Lithuania, 1979.
<u>Yugoslavia</u>	Formerly abundant, but efforts to restock were necessary in the 1960s.

Habitat and ecology

Found in burrows along the banks of well oxygenated ponds, streams, lakes and rivers. Feeds at night on worms, aquatic insects, molluscs, small vertebrates and plants. Moults periodically and matures after four years, breeding in October/November. Eggs overwinter in northern locations, hatching in June/July.

Reasons for decline

Eliminated throughout much of Europe by the crayfish plague (the fungus Aphanomyces), which has swept Europe since the 1860s. Also vulnerable to pollution (A. astacus is more sensitive to DDT than any other crayfish, and in Sweden acid rain has had a significant impact on populations); current distribution may reflect sensitivity to existing pollution levels. Alterations in watercourses and dredging causing turbidity have affected some populations. Competition with introduced species is implicated in its decline; for example it is known that interbreeding with Pacifastacus results in sterile eggs.

There are almost no reports of exploitation affecting populations, presumably because the plague has such a devastating impact. Nevertheless, it is one of the most popular edible crayfish and is collected in many countries. Fishing is usually a recreational sport and the commercial fishery is small. For example, in Finland the annual catch was about 20 million individuals in 1900; currently 1000-5000 semi-professional fishermen and 50 000 recreational fishermen take an estimated 2.5-4.0 million individuals a year. However, with the decline in populations due to the plague, catches have dropped dramatically. For example, in Hungary numbers of semi-professional fishermen dropped from about 100 in 1960 to 10-15 in 1980. In Poland, annual catches were about 15 tonnes between 1969 and 1978 but there have been no catches since 1980.

Conservation measures taken

Restrictions on fishing are enforced in a number of countries including Finland, Norway, Sweden, Denmark, France, Belgium, Switzerland, Hungary, Poland and Italy (Balzano), USSR (Lithuania). The open season is rather variable, but often over 3 or 4 months between April and October, when breeding begins. The minimum size limit, where imposed, is often 9 or 10cm, 12cm in Switzerland. In the Netherlands, Luxembourg and eight Swiss cantons the Noble Crayfish is fully protected (although probably already extinct in Luxembourg); in Poland trapping was banned for the years 1980/81 in an attempt to restore stocks.

Conservation measures proposed

The Noble Crayfish has declined to such a serious degree that protection of prime habitat and research to develop a strain resistant to the crayfish plague have become essential. Control of exploitation should be maintained. Addition to Appendix III of the Bern Convention is recommended, thus strengthening national efforts with international support. Appendix III would allow monitoring of fishing levels throughout the party states. The FAO European Inland Fisheries Advisory Commission (EIFAC) Working Party on crayfish is running a major programme to collect data on stocks, fisheries, catch and research. Countries involved include Finland, France, Poland, Sweden, UK and USSR. There have been a number of attempts at commercial rearing and culture, the most successful operation being in Norway where some 25 000 juveniles are produced annually for restocking. Captive breeding experiments have also been carried out in Finland, France, USSR (Lithuania), Sweden and West Germany; stock enhancement studies are underway in Belgium.

References to most statements in this data-sheet are given in full in Wells, Pyle and Collins (1983).

47. Austropotamobius pallipes (Lereboullet. 1858) VULNERABLE

Phylum ARTHROPODA Class CRUSTACEA

Order DECAPODA Family ASTACIDAE

Common names White-clawed or Atlantic-stream Crayfish

Distribution

Found throughout much of Europe, including Federal Republic of Germany, Switzerland, France, U.K., Portugal, Spain, Italy, Yugoslavia, Austria, Ireland.

Status in Europe

Austria Recently found in a tributary of the River Gail, southern Carinthia.

Belgium Probably does not occur.

Ireland Widely distributed in limestone and other calcareous areas; the only native crafish. Rather abundant in County Westmeath and County Fermanagh.

<u>France</u>	Mainly in mountain streams; commonest indigenous crayfish. Decimated by crayfish plague and further affected by pollution.
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Germany (FRG) No data.

Italy Northern regions.

Portugal Restricted range. Listed as threatened (Baeta Neves, 1959).

Spain North and central regions. In slow-flowing streams of highland plains and marshy areas of the Mancha.

Switzerland Abundant in certain lakes in Graubünden and some canals in Valais.

United Kingdom The only naturally occurring crayfish (the UK and Irish populations probably represent a significant proportion of the world population). Not present in Scotland but until the early 1980s was locally common and more widespread than in many other countries. The plague reached the UK in the early 1980s and has had disastrous consequences; it is thought that the species may disappear. This problem is compounded by the species sensitivity to pollution and habitat loss.

Yugoslavia	No data
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Habitat and ecology

In Europe mainly in mountain streams. In UK its habitat is more variable, including relatively still waters with a pH down to 7.0. Prefers limestone or calcareous areas and alkaline waters. Young are predated by eels, coarse fish and trout and mortality amongst juveniles is high. Maturation takes about three years; life-span may exceed ten years. Preferred foods include small animals such as copepods, but plant food is taken. Breeding is in September/October, hatching in May/June.

Reasons for decline

Declining in many parts of its range. Decimated in France and Spain by crayfish plague (the fungus Aphanomyces) which was recently introduced to the UK, with disastrous consequences. Declining still further in France due to industrialization and pollution, and in Spain due to dredging, pollution and overfishing. Irish populations are free of plague, but declining, perhaps due to habitat alteration and urban growth. Pollution and eutrophication are incompatible with A. pallipes. Drought adversely affected the UK populations in 1976.

Growing interest in commercial culture of exotic crayfish (e.g. the American Pacifastacus leniusculus) could pose a threat. A. pallipes would probably be out-competed if the introductions were to escape. Introductions and other commerce with European crayfish farms could be a serious hazard in terms of spreading the plague.

This species has considerable commercial value. For example, in Spain, 20-30 million individuals are caught annually by some 80 professional, 10 000 semi-professional and 900 000 recreational fishermen. In the UK it used to be eaten extensively but is now an occasional delicacy. The FAO European Inland Fisheries Advisory Commission (EIFAC) Working Party on crayfish is running a major programme to collect data on stocks, fisheries, catch and research.

Conservation measures taken

Spain and France have size and seasonal restrictions on capture. Fishing of all Astacidae is regulated throughout Switzerland and eight cantons have protected A. pallipes completely. In Ireland the use of nets and traps is licensed and the import of exotic crayfish into northern or southern Ireland is totally prohibited. Some transplantation of threatened populations has been attempted in UK. Captive breeding programmes exist in France, Spain, Ireland and UK. The UK Nature Conservancy Council is currently formulating a policy for the protection of this species (Lowery, pers. comm.).

Conservation measures proposed

Wild harvesting should be monitored under a licensing system. Imports of exotic crayfish should be discouraged and carefully monitored; cultivation of A. pallipes should be encouraged instead. Research on crayfish plague is needed. A. pallipes is in decline throughout its range and the species is suitable for listing under Appendix 3 of the Bern Convention.

References to most statements in this data-sheet are given in full in Wells, Pyle and Collins (1983).

8. MOLLUSCA

This section considers only non-marine molluscs, of which an increasingly large percentage of European species is coming under threat. Several aspects of their biology make them highly susceptible to rapid environmental changes. Many terrestrial species require humid or wet conditions, living for example under dead logs or in leaf mould on the forest floor. The felling of woodlands, clearance of hedgerows and cultivation of calcareous downlands, all of which provide suitable damp or chalky habitats, have caused a decrease in the range of several species (Kerney and Stubbs, 1980). Molluscs often have a low vagility and a tendency to speciate within very confined areas that are vulnerable to single disruptive occurrences. Woodland species and relict species with small ranges are therefore particularly vulnerable, including Elona quimperiana (see data sheet), Truncatellina arcyensis, Vallona spp., Trichia spp. and Trochoidea geyeri (Kerney and Cameron, 1979).

Wetland species may require waters of a high pH. Loss of wetlands is responsible for the decline of many species in the genus Vertigo, which are found only in calcareous fens and marshes. Of the 13 species occurring in Europe, 12 are considered threatened in one or more countries and four are proposed for Bern listing (see data sheets below). The succineids such as Catinella arenaria and Oxyloma sarsi (both proposed for Bern listing) are also vulnerable to wetland loss.

Atmospheric pollution with sulphur dioxide is known to have an adverse effect on two European snails, Balea perversa (see data sheet) and Clausilia bidentata (Holyoak, 1978). With the spread of acid rain throughout Europe, these and other species may come under increasing pressure. Several authors have expressed concern that acid rain may have an impact on molluscs similar to that recorded for fish and flora, citing in particular the alpine fauna which includes many endemics; threatened alpine molluscs in Austria, Bavaria, Hesse and Switzerland are discussed by Gepp (1985). The only known research to have been carried out on the impact of acid rain on molluscs concerns the pea mussels, Pisidium spp., a group important in the diet of freshwater fish. This study was part of the Norwegian SNSF Project: 'Acid Precipitation - effects on Forest and Fish' (Okland and Kuiper, 1982) and was initiated as a result of the recent extensive acidification of Norwegian watercourses, fish populations having disappeared or declined in more than 1000 lakes. Pea mussel populations have responded less dramatically but some species seem to be susceptible and act as useful indicators for monitoring the fall in pH values. Pisidium species are considered threatened in many countries but researchers working on this genus believe that overall no species is of conservation concern, and none are being proposed for the Bern Convention. Their small size means that they are easily overlooked; there is also often doubt about their distributions, as they are very easily dispersed.

Many molluscan species are of value to man for food or for products obtained from the shell. Few species are directly threatened by such exploitation, but this can be a potential threat, particularly if the species is under pressure from other factors such as habitat loss or pollution. The Freshwater Pearl Mussel Margaritifera margaritifera is proposed for Bern listing; although now threatened by pollution, its current rarity in Europe is largely due to intensive harvesting for its pearls earlier this century. The status of the Roman Edible Snail, Helix pomatia, is rather more controversial. Exploitation of this species for food has caused population declines in many parts of Europe but in other areas it

appears to be thriving. Given the need for careful management of this species it is proposed for listing on Appendix III although it is not yet considered seriously threatened.

Documentation of mollusc distribution and conservation status has accelerated over the last decade in Northern Europe. The European Invertebrate Survey has initiated mollusc mapping schemes in about 25 countries (Kerney, 1982). Atlases have been produced for Britain, Hungary, Netherlands and part of West Germany and are in preparation for a number of other countries. Coordination of these schemes across Europe will enable the exact status of rarities to be identified, identifying the small and often vulnerable habitats upon which they depend, and will give an indication of the more widespread species which are declining.

Kerney and Stubbs (1980) list some 40 UK species restricted to primary habitats and to man-made habitats with a long, stable history, such as old limestone grassland. Many of these are rare, local and declining, and the presence of one or more of these species is a useful indication of the conservation value of a site. Kerney (1982) considers that in the UK about 25 of the known 190 molluscs (c. 13 per cent) are threatened. The majority of these are listed by Foster (1983) in a national review identifying potential species for a UK Mollusc Red Data Book. About 15 per cent of the land molluscs of "Central" Europe are considered threatened (Ant, 1976) and up to 50 per cent of the freshwater mollusc fauna. The West German and Austrian Red Data Books between them list well over 100 threatened and potentially threatened species (Blab *et al.*, 1984; Gepp, 1983). In Austria over 50 per cent of the mollusc fauna is considered threatened. The Red Data Book for the province of Hessen in Germany lists 50 per cent of the fauna, of which 2 per cent is extinct, 27 per cent endangered and 21 per cent vulnerable (Jungbluth, 1978). In the Netherlands there is particular concern for the fauna of the coastal area and of the southern part of the province of Limburg (Butot, 1981), threatened by urban development, industry and agriculture. The Systematic Catalogue of Swiss Mollusca lists 67 per cent (185 out of 276 species) of the mollusc fauna in the IUCN categories Extinct, Endangered, Vulnerable, Rare, Indeterminate or Insufficiently Known, of which 9 species are considered Endangered and 67 Vulnerable (Turner and Wuthrich, 1985). The Red Data Book for the USSR lists 23 molluscs, largely wetland species, including 14 freshwater mussels (Bannikov and Sokolov, 1984). Molluscan Red Data Books were reportedly being prepared in Czechoslovakia and Yugoslavia in 1983.

Data on the conservation status of the non-marine molluscs of Southern Europe is at present almost entirely lacking. The taxonomy of Mediterranean snails is still confused. Many species are, for climatic reasons, adapted to open habitats and have been favoured by the creation of similar environments by man (stone walls, waste ground etc.). Destruction of the original forest cover has increased summer ground temperatures and favoured warmth-loving species, which have dispersed further northwards, resulting in wide distributions. Some species show a bewildering range of variation, probably due to the fact that there has been a continuity of evolution in much of southern Europe from a remote geological period, relatively unaffected by the massive extinctions caused further north by the Pleistocene ice ages. The fauna includes large numbers of narrow endemics, particularly in the Carpathians, Albania, Yugoslavia and Northern Greece, and in caves in the Pyrennees and Eastern Europe. The vast number of endemics in Lake Ohrid constitutes half the freshwater mollusc fauna of Europe; a major alteration to the lake would therefore wipe out many species. Kerney *et al.* (1983) provide a guide to the more common snails of

Mediterranean France; Holyoak (19??) describes the molluscs of Corsica and Sacchi (19??) outlines the biogeographical and ecological interest of the Iberian peninsula fauna. Given the rapid development of the Mediterranean region, in terms of industry and tourism, there would seem to be an urgent need for a survey of the non-marine mollusca of this region, to identify those species at risk. Molluscs have been cited as of interest in conservation planning for Gibraltar (Cortes, 1978; Anon, 1980) and Malta (9 species listed as threatened, 11 as of concern and 11 endemic taxa) (Thake, 1985).

The terrestrial molluscs of the Azores (41 endemic species and subspecies), Madeira (193 endemics), the Canary Islands (141 endemics) and the Cape Verdes (16 endemics), basically a relict assemblage, are potentially of great conservation concern. Although the faunas have a common background, remarkably few taxa are shared by the archipelagos due to differences in geological history, climate and geographical location in relation to the continental mainland. Madeira has a key position, with its markedly high diversity and endemism, as a centre of evolution and for dispersal to other archipelagos. It has virtually nothing in common with the fauna of the adjacent north-west African mainland, its affinities being strictly European (Walden, 1984; Sacchi, 19??; Andre, 19??). Sixteen of the endemics are proposed for listing and indicate some of the threats operating on the species of these islands.

Awareness of the need for land snail conservation is growing. The UK lists Catinella arenaria, Monacha cartusiana and Myxas glutinosa under the Wildlife and Countryside Act. Switzerland has included several snails in its protective legislation. France gives total protection for the terrestrial snails, Helix melanostoma, H. aperta, H. tristis, Tacheocampylaea raspaili, Macularia niciensis, Otala apalolena, Rumina decollata, Elona quimperiana (all Mediterranean species) and the freshwater mussel Margaritifera margaritifera and controls collection of the edible snails Helix pomatia, Helix aspersa and Zonites algirus (a Mediterranean species) (Real and Testud, 1980). At the 8th International Malacological Congress, Budapest, 1983, a resolution was passed recommending that a report be prepared 'with information about significant trends in mollusc populations (in Europe) over recent years, especially those showing extinction risks'. The status of all European non-marine molluscs is being assessed at the IUCN Conservation Monitoring Centre. Although a wealth of data has already been collected, the project has not yet reached the analysis and publication stages. The disparate nature of the data is reflected in the patchiness of the data sheets that follow.

One of the criteria suggested for invertebrate candidates for the Bern Convention is that a species must be reasonably easy to identify and preferably familiar to members of the general public. Unfortunately, land snails are generally small, inconspicuous and often difficult for the non-specialist to identify. On this criterion alone, therefore, it would be necessary to eliminate many highly threatened species. However, given the comparatively sedentary nature of terrestrial molluscs, and the precise distributional data which are now becoming available, protection of the appropriate sites for such species should be feasible. Since the Bern Convention emphasises habitat protection, it is suggested that threatened non-marine molluscs are considered for listing, even if they present identification problems for the layman.

48. Myxas glutinosa (Muller, 1774)

VULNERABLE

Phylum MOLLUSCA

Class GASTROPODA

Order BASOMMATOPHORA

Family LYMNÆIDAE

Common names Glutinous Snail (En)

Distribution

Northern Europe, between the Alps and the Arctic Circle (Finland to 71°N) but everywhere very local.

Status in Europe

<u>Austria</u>	Endangered, possibly extinct. Tyrol. Decline due to habitat destruction.
<u>France</u>	Indeterminate; rivers in Aube, possibly strongly declining.
<u>Germany (FRG)</u>	Endangered; listed in Red Data Book (Blab <u>et al.</u> , 1984).
<u>Germany (GDR)</u>	Extinct. Not seen since the last century.
<u>Ireland</u>	Vulnerable; local in midlands; possibly decreasing from pollution. Still common in a few places in the Royal and Grand Canals.
<u>Netherlands</u>	Vulnerable. Characteristic of <u>Stratiotes aloides</u> vegetation which has disappeared from many localities.
<u>Norway</u>	Rare; three lakes in extreme south-east; northernmost lake highly eutrophic over last 20 years and species may be extinct.
<u>Poland</u>	Vulnerable
<u>Sweden</u>	Scattered localities in south and central areas.
<u>United Kingdom</u>	Endangered; probably extinct. Last recorded 1957 and most British records date from before 1914. Present in north-west England and Wales. Protected under the Wildlife and Countryside Act; considered as candidate for UK Red Data Book listing.

Habitat and ecology

Found in quiet, very clean, hard freshwater, in drainage ditches, marshes, canals, slow rivers and lakes. Does not tolerate brackish water. Calciphile and possibly very sensitive to pollution. Avoids turbid or weed-choked places and likes firm substrates.

Reasons for decline

Reasons are unclear but species is possibly sensitive to pollution and physical disturbance.

Conservation measures taken

Protected in UK.

Conservation measures proposed

Recommended for listing on Appendix II of the Bern Convention. Its long term survival in Ireland may depend on protecting sites in the Royal and Grand Canals, especially the latter, which is now abandoned and rapidly degenerating (Kerney in prep.).

49. Segmentina nitida (Muller, 1774)

VULNERABLE

Phylum MOLLUSCA

Class

GASTROPODA

Order BASOMMATOPHORA

Family

PLANORBIDAE

Common names Shining Ram's Horn Snail (En).

Distribution

Northern and Central Europe.

Status in Europe

Austria Endangered but widespread. Threatened by pollution, habitat destruction and lowering of water table. Listed in the Red Data Books (national and Steiermark).

Bulgaria Vulnerable.

France Very rare and poorly known; found rarely in old beds of the Rhone river in the east.

Germany (FRG) Rare

Germany (GDR) Vulnerable. Threatened by swamp drainage.

Hungary Not threatened.

Ireland Present.

Netherlands Not threatened. Found in stagnant freshwater, rich in vegetation, especially Stratiotes.

Norway Rare. Found only in a single overgrown lake in extreme south-east, now established as a reserve.

Poland Not threatened.

Sweden Rare. South, scattered localities.

Switzerland Vulnerable. Rare in west, north and east.

United Kingdom Vulnerable. Sussex and E. Anglia. Formerly widespread in ponds in the 19th century; now confined to well oxygenated marsh drains with lush vegetation. Threatened by dredging, habitat destruction and pollution. Considered as candidate for UK Red Data Book listing.

Habitat and ecology

Ponds and weedy ditches, drainage ditches in marshes; occasionally lakes.

Reasons for decline

Unknown.

Conservation measures taken

None known, other than listing in Red Data Books.

Conservation measures proposed

Suitable for listing on Appendix II of the Bern Convention.

50.	<u>Catinella arenaria</u>	(Bouchard-Chanteroux, 1837)	VULNERABLE
Phylum	MOLLUSCA	Class	GASTROPODA
Order	STYLOMMATOPHORA	Family	SUCCINEIDAE

Common names Sandbowl Amber Snail (En)

Distribution

Northern Europe.

Status in Europe

<u>Belgium</u>	Not recorded since 1960.
<u>France</u>	Endangered. West coast.
<u>Germany (FRG)</u>	Vulnerable. Listed in Red Data Book; (Blab <u>et al.</u> , 1984).
<u>Germany (GDR)</u>	Threatened; coastal.
<u>Ireland</u>	Endangered. Tipperary, a glacial relict threatened by drainage.
<u>Netherlands</u>	Endangered and rare. Twelve localities situated in coastal dune areas of northern and southern Holland and Zeeland. Disappeared from several other localities. The localities are unstable, consisting of pioneer vegetation. Threatened by dyke building, dune reclamation and drainage.
<u>Norway</u>	Possibly extinct. The northern edge of its range. Last seen 1925.
<u>Poland</u>	Rare. Known from a single site at the village of Sitkowa, near Kielce, Swietokrzyskie Mountains.
<u>Sweden</u>	Vulnerable. Present in mountains, Oland and Gottland. On the edge of its range. Listed in forthcoming book on threatened forest invertebrates.
<u>Switzerland</u>	Rare. Present in Grisons and Valais.
<u>United Kingdom</u>	Endangered (Kerney, 1982). Very rare and found only in two sites, north Lancashire and Devon. Its decline may be partly due to climatic changes. Protected in the UK, under the Wildlife and Countryside Act. Considered a candidate for UK Red Data Book listing.

Habitat and ecology

Wetlands are the main habitat of this species, particularly calcareous fens, dune slacks (Ireland) and primary dunes. Coastal in the Netherlands.

Reasons for decline

Drainage is the main problem. The species presumably requires some disturbance and regeneration of its habitats because it prefers pioneer vegetation (in UK).

Conservation measures taken

Protected in the UK under the Wildlife and Countryside Act.

Conservation measures proposed

In the Netherlands, recommended for legal protection on 10 August 1984 by Natuurbeschermingsraad. Recommended for listing on Appendix II of the Bern Convention. (Although this species can be confused with Succinea oblonga, it clearly requires protection; many of its localities are known and listing on the Bern Convention would encourage protection of these sites).

51. Oxyloma sarsi (Esmark, 1886) (= Succinea elegans) VULNERABLE
Phylum MOLLUSCA Class GASTROPODA
Order STYLOMMATOPHORA Family SUCCINEIDAE

Common names Slender Amber Snail (En).

Distribution

Northern Europe. Distribution incompletely known due to confusion in the literature with O. pfeifferi.

Status in Europe

Austria Endangered. Steiermark and Lower Austria.
Belgium Declining strongly.
Denmark Vulnerable. Edge of range.
France Indeterminate; fenlands.
Germany (FRG) Vulnerable; listed in Red Data Book (Blab et al., 1984).
Germany (GDR) Insufficiently known.
Hungary Not threatened.
Netherlands Not threatened.
Norway Vulnerable or insufficiently known. Northern areas, on the edge of its range.
Poland Not threatened.
Sweden Not threatened but declining.
United Kingdom Very rare. Confined to East Anglia. Considered as a candidate for UK Red Data Book listing. Known by the name Succinea elegans by British authors after 1926.

Habitat and ecology

Emergent vegetation in rich calcareous fens and marshes, characteristically on Glyceria and floating water plants.

Reasons for decline

Drainage.

Conservation measures taken

None known.

Conservation measures proposed

Recommended for listing on Appendix II of the Bern Convention, despite difficulty of identification and confusion with O. pfeifferi.

52. <u>Vertigo angustior</u> Jeffreys, 1830		VULNERABLE	
Phylum	MOLLUSCA	Class	GASTROPODA
Order	STYLOMMATOPHORA	Family	VERTIGINIDAE

Common names Narrow-mouthed Whorl Snail (En).

Distribution

Northern and Central Europe.

Status in Europe

<u>Austria</u>	Not threatened.
<u>Belgium</u>	Endangered. Declining strongly.
<u>Denmark</u>	Vulnerable.
<u>Finland</u>	Status uncertain. Found on the south coast.
<u>Germany (GDR)</u>	Vulnerable. Threatened by drainage.
<u>Ireland</u>	Vulnerable. West/central, habitat loss.
<u>Netherlands</u>	Vulnerable. Coastal, east.
<u>Norway</u>	Vulnerable. Edge of range; southern regions.
<u>Sweden</u>	Vulnerable. Edge of range; southern regions. Listed in Swedish book of threatened forest invertebrates (in prep.).
<u>Switzerland</u>	Vulnerable. South, west and north.
<u>United Kingdom</u>	Endangered. Only three modern sites in East Anglia and Cumbria. Habitat destruction is the cause of decline. Considered as a candidate for UK Red Data Book listing.

Habitat and ecology

V. angustior prefers open habitat without shading, including wet grassy meadows, dune slacks and moist dunes.

Reasons for decline

A declining species (Kerney and Cameron, 1979).

Conservation measures taken

None known.

Conservation measures proposed

Recommended for listing on Appendix II of the Bern Convention.

53. Vertigo genesii (Gredler, 1856)

VULNERABLE

Phylum MOLLUSCA

Class GASTROPODA

Order STYLOMMATOPHORA

Family VERTIGINIDAE

Common names Round-mouthed Whorl Snail (En).

Distribution

Northern and Central Europe.

Status in Europe

Germany (FRG) Vulnerable/Endangered in the Red Data Book (Blab et al., 1984).

Netherlands Extinct. Recorded only as a fossil, probably not recent.

Norway Vulnerable. In northern regions, on the edge of its range.

Poland Probably occurs but very rare. Old records for Poland refer to localities near Bialowicza, now in USSR.

Sweden Vulnerable. On the edge of its range (listed in a Swedish book of threatened forest invertebrates (in prep.)).

Switzerland Rare; Grisons.

United Kingdom Endangered. A single locality only, in Durham. First recorded 1979. Considered as a candidate for UK Red Data Book listing.

USSR Occurs near Polish border near Bialowicza (Dyduch, 1980).

Has been considered conspecific with V. geyeri but Kerney and Cameron (1979) list it as a good separate species.

Habitat and ecology

Wetlands: marshy ground, base-rich flush among Carex demissa; reaches 2000 m in Alps.

Reasons for decline

Unknown.

Conservation measures taken

None known.

Conservation measures proposed

Recommended for listing on Appendix II of the Bern Convention.

54. Vertigo geyeri Lindholm, 1925

VULNERABLE

Phylum MOLLUSCA

Class GASTROPODA

Order STYLOMMATOPHORA

Family VERTIGINIDAE

Common names A Whorl Snail (En).

Distribution

Northern Europe.

Status in Europe

Austria Rare but fairly widespread.

Denmark Endangered.

Ireland Endangered. Threatened by drainage; a glacial relict

Norway Endangered. Found in the north, where it is on the edge of its range.

Poland Doubtful records; may have been confused with V. alpestris. If a true record, it is found in meadows and glades and is rare/threatened.

Sweden Vulnerable. On the edge of its range in Westergotland. Listed in a forthcoming book of threatened forest invertebrates.

Switzerland Rare; Inner Appenzell and Gisons.

United Kingdom Endangered. One locality only, in Westmorland. A glacial relict. Considered as a candidate for UK Red Data Book listing.

Habitat and ecology

Wetlands: marshy flushes and fens with constant water table; uplands; calciphile.

Reasons for decline

Unknown.

Conservation measures taken

None known.

Conservation measures proposed

Recommended for listing on Appendix II of the Bern Convention.

55. Vertigo moulinsiana (Dupuy, 1849) ENDANGERED
 (= V. desmoulinsi)
- Phylum MOLLUSCA Class GASTROPODA
- Order STYLOMMATOPHORA Family VERTIGINIDAE
- Common names Desmoulins' Whorl Snail.
- Distribution
- Europe, probably Holarctic.
- Status in Europe
- Austria Endangered, probably nearly extinct. Steiermark; south of Klagenfurt, South Tirol (Butot and Neuteboom, 1958). In chalky soil in swamps and banks of stagnant waterways.
- Belgium Probably extinct; not found since 1960 (Van Goethem, 1983). Previously recorded from south-east of Brussels (La Hulpe and Genval) (Adam, 1944).
- Bulgaria Philippopol, Maritzadal (Hesse, 1916).
- Czechoslovakia Jasov, Teplicadal (Lozek, 1956); Bardejov (Rotarides & Weis, 1950). Relict populations need protection (Lozek, 1956).
- Denmark Few data; found near Aarhus (Schlesch, 1943). On the edge of its range in this country.
- France Indeterminate. Départements of l'Ain, l'Aisne, l'Oise, Bas Rhin, Haute Garonne, Gironde (Germain, 1930).
- Germany (FRG) Endangered (Ant, 1976) and listed in Red Data Book (Blab et al., 1984). Scattered localities - East Mecklenburg; near Berlin; Rhine valley; Westfalen; Baden (Haas, 1929). Disappeared from some localities as a result of drainage (Butot & Neuteboom, 1958).
- Germany (GDR) Endangered. Distribution unknown.
- Hungary Possibly not threatened. Scattered localities including area around Budapest, north of Lake Balaton; extreme east and two sites on the Kiskun plain (Pinter et al., 1979).
- Ireland Vulnerable; threatened by drainage of lowland fens in central areas (Kerney, 1976).
- Italy Rare. Sicily, Padua, Mantua (Novara, Alessandria, Aosta, Novara) (Butot and Neuteboom, 1958).
- Netherlands North-west edge of range, in the Geleen Valley, Schinnen (Butot and Neuteboom, 1958); some populations lost through road and house building (Butot, 1982) but two populations recently rediscovered (Gittenberger, 1983), one of which is threatened by water course alteration and increased access to marshes plus lowering of the water table.

- Poland Endangered, virtually extinct. Known in Bialowieza National Park (Dyduch, 1980) and the reserve Dziekanow Lesny (1956) in Kampinos Forest near Warsaw. A new site turned up in July 1985. Localities have been destroyed by mowing and drainage (Pokrysko, 1983).
- Spain Near Barcelona and along the Ebro and small rivers in northeastern Catalonia (Boettger, 1936; Haas, 1929).
- Sweden Endangered. Southern parts.
- Switzerland Rare. Cantons of Geneva, Vaud, Valais, Berne, Argovia, Fribourg (Mermod, 1930).
- United Kingdom Vulnerable; populations declining. Present in South-east, East Anglia and north Wales (single record); isolated localities (Kerney 1976). Declining because of drainage of fens and marshes. A candidate for UK Red Data Book listing.
- USSR Recorded Poti (on edge of Black Sea) (Westerlund, 1887) and Helenendorf near Elisabethpol (Boettger, 1889); south-west Lithuania (Schlesch, 1943).

Habitat and ecology

Calcareous fens and marshes; often on Phragmites at the edges of lowland lakes or rivers (Kerney and Cameron, 1979). It is a relict of warm interglacial or post glacial periods. Further details given in (Butot and Neuteboom, 1958). Feeds on moulds on marsh grasses and reeds; requires high humidity and warmth and normally lives above-ground on the stems of plants.

Reasons for decline

Considered to be declining in Europe by the 1950s. Altering water levels, mowing river meadows and cultivating or reclaiming marshes threaten remaining populations (Butot and Neuteboom, 1958; Kerney and Cameron, 1979).

Conservation measures taken

- FRG A population occurs in the "Enkheimer Reid" nature reserve, south of Frankfurt, (Butot and Neuteboom, 1958).
- Czechoslovakia Population in River Teplica valley protected by State Nature Reserve (Butot and Neuteboom, 1958).
- Netherlands Recommended for legal protection, 10 August 1984, by Natuurbeschermingsraad.
- Poland Occurs in Dziekanow Lesny Reserve and Bialowicza National Park (Pokrysko, 1983).

Conservation measures proposed

Protection of remaining sites required in most countries. Listing under Appendix II of the Bern Convention is appropriate.

56. Geomalacus maculosus Allman, 1843

VULNERABLE

Phylum MOLLUSCA

Class GASTROPODA

Order STYLOMMATOPHORA

Family ARIONIDAE

Common names Kerry Slug (En).

Distribution

Ireland, formerly Brittany.

Status in Europe

France Extinct. Last definite record was 1868.

Ireland Recently collected at Uragh Woods, Kerry, west County Cork - a new National Nature Reserve. Apparently now confined to Ireland where it is locally common (Reynolds, 1983). Precise degree of threat uncertain, but definitely of international interest.

Habitat and ecology

On lichens and rocks in damp deciduous woodland.

Reasons for decline

Unknown.

Conservation measures taken

Present in at least one reserve in Ireland.

Conservation measures proposed

Recommended for listing on Appendix II of the Bern Convention.

(Note in English proof only: this species probably also occurs locally in northern Spain and Portugal; there is no information on its status in these countries.)

57. Balea perversa (L., 1758)

VULNERABLE

Phylum MOLLUSCA

Class

GASTROPODA

Order STYLOMMATOPHORA

Family

CLAUSILIIDAE

Common names Tree Snail (En).

Distribution

Widespread in northern Europe, but becoming rarer to the east and scarce in the north German plain. Mainly coastal in Scandinavia.

Status in Europe

Austria Vulnerable.

Belgium Declining strongly.

Denmark Vulnerable.

Finland Rare. South coast only.

France Not threatened.

Germany (FRG) Not threatened.

Germany (GDR) Rare.

Hungary Not threatened.

Iceland Rare, possibly vulnerable.

Ireland Not threatened.

Luxembourg Not threatened.

Netherlands Rare. Found on bark of old trees, on old walls, river banks. Vulnerable to habitat destruction.

Norway Not threatened.

Poland No data.

Portugal Azores (S. Miguel) (complete distribution in this country not known).

Sweden Not threatened, but declining in non-calcareous areas. On the edge of its range.

Switzerland Rare. Scattered localities up to 1500m.

United Kingdom Common and not threatened. In the south prefers hedgerows and other isolated trees rather than extensive forest. May have increased in recent years but will decline when dead elms disappear.

Habitat and ecology

Dry exposed places among rocks and old stone walls, less commonly in trees, very occasionally in ground litter.

Reasons for decline

Known to be susceptible to pollution by sulphur dioxide (Holyoak, 1978).

Conservation measures taken

None known.

Conservation measures proposed

Recommended for listing on Appendix II of the Bern Convention.

58. Helix pomatia Linnaeus, 1758

VULNERABLE

Phylum MOLLUSCA

Class

GASTROPODA

Order STYLOMMATOPHORA

Family

HELICIDAE

Common names Roman snail, Apple snail, Edible snail (En).
Escargot de Bourgogne (Fr), Gewöhnliche Weinbergschnecke (Ge)

Distribution

Widespread in Central and south-eastern Europe, extending westwards to central France and south-east England and north to the south Baltic coasts. Distribution may be naturally alpine but introduced to lowland areas in many places and to many countries in the north and west of Europe.

Status in Europe

<u>Austria</u>	Declining; common in broadleaf lowland forest along rivers; lowland and woodland populations threatened by heavy exploitation for export to France; mountain and forest populations more secure.
<u>Belgium</u>	Declining especially in the provinces of Hainaut, Liege and Brabant, presumably because of over collection although pesticides have also been cited.
<u>Bulgaria</u>	Populations healthy.
<u>Czechoslovakia</u>	Populations healthy.
<u>Denmark</u>	Introduced.
<u>Finland</u>	Introduced.
<u>France</u>	Introduced in the west. Marked decline in populations has been reported, due to overcollection and possibly pesticides.
<u>Germany (FRG)</u>	Distribution corresponds to calcareous areas. Protected by law of 19.12.86.
<u>Germany (GDR)</u>	Vulnerable but locally increasing.
<u>Greece</u>	No information.
<u>Hungary</u>	Not threatened.
<u>Italy</u>	North; not threatened.
<u>Luxembourg</u>	Not threatened.
<u>Netherlands</u>	Some populations declining, e.g. in the Limburg. Introduced.
<u>Norway</u>	Introduced to very few sites.

<u>Poland</u>	Not threatened but may have disappeared from areas with heavy collecting pressure. Found throughout the country but indigenous to the south only; irregular distribution in the Carpathians.
<u>Romania</u>	Found at 800-1000m in wide variety of habitats including parks, gardens and woods; lowland populations said to be declining but since collecting regions are changed each year, probably not threatened nationally; forest and mountain populations largely secure.
<u>Spain</u>	No information.
<u>Sweden</u>	Introduced; populations healthy.
<u>Switzerland</u>	Vulnerable; some populations declining, particularly those subject to heavy exploitation. Abundant in limestone, dolomite and marl regions of Alps, Jura and Swiss Plateau but also in regions with siliceous bedrock.
<u>United Kingdom</u>	Introduced in Roman times; restricted to south; rare but probably not declining; have been fears of local extinctions; habitat destruction likely to be main threat.
<u>Yugoslavia</u>	Possibly declining.

Habitat and ecology

Usually requires limestone or calcareous soils, generally in open woodland, downland, hedges and tall herbage, but in many countries calcareous soils do not appear to be essential. Hibernates in winter. Feeds on a variety of plants. Maturity reached at 2-5 years; reproductive potential high but success is low due to high mortality among eggs and juveniles. Adults are very long-lived and recruitment of new adults to population is slow.

Reasons for decline

Primary cause of depletion in many countries is overexploitation. Currently collected in Austria (large quantities used to be exported), France (for internal use), Germany (large quantities exported), Hungary (large quantities exported), Poland (large quantities exported), Romania (large quantities exported), Switzerland (also imports large quantities), Spain and Yugoslavia. In most cases, current population declines appear to be localised, limited to areas of intensive exploitation.

Conservation measures taken

Collecting is controlled by means of closed seasons and/or minimum size limits in FRG, Austria, Hungary, Switzerland, Italy, France, Bulgaria, and Belgium. Exploitation is prohibited in the Netherlands, in some parts of Switzerland and in Luxembourg unless the written consent of the landowner is obtained. Helix pomatia occurs incidentally in protected areas in at least Britain, the Netherlands, Poland, Switzerland and Hungary but no reserves have been created specifically for this species. Research into the farming potential of this species has been carried out in France, Poland, Netherlands, Austria and Hungary. Most successful enterprises have involved the rearing of juveniles taken from the wild, rather than captive breeding.

The Petit Gris Snail, Helix aspersa, although not considered such a delicacy is now farmed and may take the pressure of H. pomatia populations.

Conservation measures proposed

Recommended for listing on Appendix III of the Bern Convention. Research on this species should continue to be encouraged, particularly in areas which can provide the necessary data for designing effective management strategies for wild populations and lead to successful captive breeding enterprises.

59. Elona quimperiana (Férrusac, 1821) VULNERABLE

Phylum MOLLUSCA Class GASTROPODA

Order STYLOMMATOPHORA Family ELONIDAE

Common names Escargot de Quimper (Fr)

Distribution

France and Spain; a narrow distribution (Kerney & Cameron, 1979; Gittenburger, 1979).

Status in Europe

France Legally protected. Occurs in Brittany west of a line drawn from Saint-Brieuc to Vannes.

Spain May occur in the North-eastern Atlantic coastal areas (Basque region).

Habitat and ecology

Moist deciduous forest and damp heathlands, under stones and bushes. Ecology poorly known but growth studies have been carried out (Daguzan, 1980). Recently put in new family with one other species E. pyrrenaica (Gittenberger, 1979).

Reasons for decline

Occurs very locally in primary woodland, a habitat rapidly disappearing.

Conservation measures taken

Legally protected in France.

Conservation measures proposed

Recommended for listing on Appendix II of the Bern Convention.

60-75. Endemic Land Snails of Madeira (16 species)

VULNERABLE

Phylum MOLLUSCA

Class

GASTROPODA

Order STYLOMMATOPHORA

Families

PUPILLIDAE
ENDODONTIDAE
HELICIDAE

Common names None known

Distribution

Madeira

Status in Europe

Pupillidae

Leiostyla abbreviata

Rare on Madeira as early as 1878.

L. cassida

Ribeira de Santa Luzia on south Madeira and Ribeira de Sao Jorge in the north. Uncommon by 1878, although abundant in subfossil form at Canical.

L. corneocostata

Porto Santo, Pta Calheta.

L. gibba

Ribeira de Santa Luzia, south Madeira. Rare by 1878 but abundant in subfossil beds at Canical.

L. lamellosa

Recorded only in south Madeira at intermediate altitudes in the Vasco Gil ravine and the Ribeira de Santa Luzia; one of the rarest snails in 1878.

Helicidae

Caseolus calculus

Ilheu de Cima; Pico d'Anna Ferreira and Pico Branco, Porto Santo. Rare by 1848.

C. commixta

Ilheu de Baixo, Porto Santo

C. sphaerula

Pico Branco, Porto Santo.

Discula leacockiana

Pico d'Anna Ferreira, Porto Santo

D. tabellata

Dry maritime slopes of Ponta Garajau, south Madeira; Cabo Girao, west of Funchal.

D. testudinalis

Pedragal, north Porto Santo.

D. turricula

Endemic to Ilheu de Cima, under large basaltic rocks.

Geomitra moniziana

Gaula and Canico in south-east Madeira; Ribeiro de Porto Nova; San Vicente.

Helix subplicata

Recorded from Ilheu de Baixo in 1878; may now be extinct; subfossil forms only found in 1930s.

Endodontidae

Discus guerinianus

Confined to damp wooded areas of Madeira at high and intermediate altitudes in interior of island. Rare by 1878.

D. defloratus

Single specimen recorded from Pico d'Arribentao above Funchal, Madeira.

Habitat and ecology

Species on Madeira are found either in the moist north forests or the dry short vegetation of the south. Snails are generally absent for the coniferous plantations. Habitats on Porto Santo and the Desertas islands are mainly dry and stony with thin soil and vegetation cover.

Reasons for decline

All the habitats of the endemic molluscs of the Madeiran archipelago are threatened by development and/or erosion. The volcanic soils are very fragile and erode rapidly after mechanical disturbance or when the vegetation is removed. Such areas used to support an endemic low scrub cover, much of which has now gone because of over-grazing by introduced cattle, sheep, goats and rabbits. The dry coastal habitats preferred by many snails are threatened by tourist developments. Since many of the endemics occur in single populations or have very small ranges, even small scale developments could result in extinctions.

Conservation measures taken

No measures have been taken specifically for molluscs. In 1981 proposals were made by the Regional Secretariat for Planning and Finance, in conjunction with the Jardim Botânico do Funchal for a series of reserves and a regional park. This was aimed primarily at the conservation of Laurisilva forest and its many endemic plants. The proposal is not yet implemented, although there is continuing awareness that action needs to be taken.

Conservation Measures Proposed

The 16 endemic Madeiran species are considered to be of particular conservation concern and are appropriate for listing on Appendix II of the Bern Convention. Further work is urgently required to determine the status of these species and to integrate conservation measures for molluscs with other initiatives in the archipelago.

Full details and references for this account are given in Wells, Pyle and Collins (1983).

76. Margaritifera margaritifera (L., 1758)
(= Margaritana margaritifera)

VULNERABLE

Phylum MOLLUSCA

Class

BIVALVIA

Order UNIONOIDA

Family

MARGARITIFERIDAE

Common names Freshwater Pearl Mussel (En), Flussperlmuschel (Ge).

Distribution

Northern Europe, Eurasia and eastern North America, where it is confined to areas east of the Appalachians on the Atlantic coast from Newfoundland, Canada, to Pennsylvania, USA.

Status in Europe

- Austria Originally common in upper Austrian Muhlviertel. Disappeared except in few unpolluted tributaries. Adults sensitive to increased phosphates in water. Mother-of-pearl industry early this century added to the problems.
- Belgium Seriously declining, probably due to pollution. Occurs in streams and rivers of the Ardennes:- Amblève, Ourthe, Lomme and Lesse. Locally common in the basins of the Semois and Vierre.
- Czechoslovakia Only six populations still survive, mainly in south Bohemia. Pollution is at least partly to blame.
- Denmark Declining in the River Varde Aa due to pollution.
- Finland Declining catastrophically, partly due to collecting since 1750, partly due to pollution and water-course alterations. Mainly present in the north, local in the south-west; confirmed living in only 45 per cent of total known range.
- France Vulnerable and strongly declining; no recent records from Dordogne or Loire Rivers where it was present in 1931. Still found in small rivers in Morvan, Massif Central, tributaries of Yonne, basin of Allier (both of these are tributaries of Dordogne and Vienne).
- Germany (FRG) Endangered, listed in Red Data Book (Blab et al., 1984). Restricted mainly to Bavaria with isolated populations elsewhere. Protected by law of 19.12.86.
- Germany (GDR) Endangered, threatened by pollution. Decreasing in south-west Saxony, extinct in east Saxony (Hertel, 1959).
- Ireland Vulnerable. Scattered localities in upland rivers and soft water; absent from many suitable sites; affected by dredging, pollution and exploitation. Confirmed living in only 19 per cent of total known range.
- Luxembourg Common at beginning of this century but in 1973 shells present in only five rivulets. Pollution a problem.

<u>Netherlands</u>	Does not occur.
<u>Norway</u>	Widespread, mainly coastal but declining from acid rain and pollution; confirmed living in only 62 per cent of total known range.
<u>Poland</u>	Extinct. Formerly numerous in Lower Silesia but in decline through pollution.
<u>Sweden</u>	Occurs from Scania to Lapland but decimated by fishing in some areas. Drainage of fens in southern Sweden is a problem, as is acidification. Now protected.
<u>United Kingdom</u>	Very local in north and west Britain, and Scotland and considered to be of regional conservation concern. Confirmed living in only 45 per cent of the total known range. Pollution has been a serious problem, as has over-fishing in some areas. Status in recent times more secure.
<u>USSR</u>	Listed in Red Data Book. Occurs in the Volga watershed and Rivers Don and Dnieper. Reduced by pollution.

Habitat and ecology

Prefers soft water without high concentrations of lime and typically likes swift flowing rivers 0.5-1.5m deep with mixture of stones and sand. Virtually sedentary as adults; depend on fish (trout and salmon) for parasitic larval stage. Mature at 12-15 years, may live for up to 100 years.

Reasons for decline

Once widely distributed throughout northern Europe, but now literally decimated through extensive exploitation for its highly-valued pearls since pre-Roman times and pollution since industrialisation (Bjork, 196?; Kerney, 1975). Over-collected in a number of countries, including UK, and now extinct in much of its range. Currently very vulnerable to watercourse alteration and possibly pollution. Any adverse effects on the larval hosts (trout) also affect the mussel.

Conservation measures taken

Protected in Finland, France, Czechoslovakia, Austria, Sweden, formerly in Denmark and in Poland until 1982 when it was deleted from the list on account of being extinct. Listed in the Red Data Books of West Germany, Austria and USSR. Management programmes are underway in Germany, (Bauer and Eicke, 1986).

Conservation measures proposed

Strict pollution control measures are needed throughout its range. Reserves are needed in unaffected areas (one has been designated in the Sumava mountains of Czechoslovakia). Young mussels under 9 cm in length never contain pearls and should not be fished. With practice a shell may be examined for pearls without destroying the mussel. M. margaritifera should be added to Appendix III of the Bern Convention.

Full details and references for this data sheet are given in Wells, Pyle and Collins (1983).

77. <u>Margaritifera auricularia</u> (Spengler, 1793)		VULNERABLE
Phylum	MOLLUSCA	Class BIVALVIA
Order	UNIONOIDA	Family MARGARITIFERIDAE

Common name Spengler's Freshwater Mussel (En)

Distribution

Originally in much of western, central and southern Europe but since about 1850 restricted to a few rivers in Portugal, Spain, Italy and France, plus a subspecies in Morocco.

Status in Europe

Czechoslovakia Extinct.

France Restricted to the rivers Adour, Allier, Arros, Aube, Charente, Dordogne, Doubs, Garonne, Loire, Lot, Oise, Seine, Saône, Saume, Tarn and Vesle. Already uncommon by 1930.

Germany (FRG) Extinct (Blab et al. 1984).

Italy Endangered. Only in the river Po. Extinct in central Italy.

Luxembourg Extinct.

Spain Endangered. Rivers Ebro and Guadalquivir only.

Switzerland Extinct.

The subspecies M. a. maroccana occurs in Morocco, but there are no data on its distribution or status there.

Habitat and ecology

Little known, but presumed to be similar to M. margaritifera. All reported occurrences are from large rivers. In the River Ebro in Spain it favours quiet pools at depths down to 6 m.

Reasons for decline

Uncertain. Like other pearl mussels, it probably has a very slow reproductive cycle coupled with a high longevity. This would cause it to be very vulnerable to heavy exploitation and may account for its widespread disappearance. Pollution has also been cited as a factor.

Conservation measures taken

None known.

Conservation measures proposed

Distribution surveys are needed, followed up by recovery plans and protection of habitats. Listing on Appendix II of the Bern Convention is appropriate.

The references for this data-sheet are given in full in Wells, Pyle and Collins (1983).

9. ANNELIDA

The conservation status of most annelids is poorly known. Of the three classes, Polychaeta, Oligochaeta and Hirudinea, the polychaetes (bristle worms) are least likely to be threatened. Their distributions in marine environments are often wide, and some (but by no means all) are tolerant of pollution and disturbance.

The Oligochaeta include aquatic species as well as the better-known earthworms. Certain earthworms originally from Europe now dominate agricultural and urban ecosystems in most temperate climates. These species are able to occupy disturbed habitats and survive transportation to alien environments. Others are known to have more restricted ranges, but data on conservation aspects are lacking. In particular, research is needed on aquatic oligochaetes. In Lake Baikal for example, 90 per cent of the oligochaetes recorded from open waters are endemic; and Baikal is well-known to be seriously polluted. The larger lakes in Europe also have endemics that could become threatened. For the time being, no oligochaetes are suitable for listing on the Bern Convention.

The Hirudinea, or leeches, almost certainly includes a number of threatened European species. Surveys are urgently required to ascertain the position, but one species, Hirudo medicinalis is known to be in decline. This species, the Medicinal Leech, is the only annelid recommended for listing on the Bern Convention and a full data sheet follows.

78. Hirudo medicinalis

VULNERABLE

Phylum ANNELIDA

Class HIRUDINEA

Order ARHYNCHOBDELLAE

Family HIRUDINIDAE

Common names Medicinal Leech (En), Blutegel (Ge)

Distribution

Western and southern Europe to the Ural Mountains and the countries bordering the eastern Mediterranean.

Status in Europe

See Elliott and Tullett (1984) for detailed references.

Albania Two records, no data on status.

Austria Vulnerable as a result of habitat loss. Two records.

Belgium A single recent record (near Arlon in 1979). Previously not seen since 1938 (Marquet, 1985).

Bulgaria Vulnerable. Abundant in certain areas, but drainage of marshes is a threat. Two recent records; formerly widespread.

Czechoslovakia Rare; extinct in some places. Drainage of marshes is a threat. Four recent records.

Denmark Not seriously threatened. Currently known from 33 localities.

Finland Indeterminate, but in drastic decline. Many records up to 1900 for areas up to 63°N; now only in a few localities on the south-west mainland coast and on Åland island (Wells, Pyle and Collins, 1983).

France Declining. Present in the Camargue, probably in the Marais de Carentan in Normandy and elsewhere. Four recent records. Reportedly collected from the wild around Bordeaux for export. Widespread drainage of marshes is a threat. The Camargue population may be threatened by changes in salinity.

Germany Considered almost extinct in both FRG and GDR by 1922, but in fact a few localities still persist. No data on threats. Protected in FRG by law of 19.12.86.

Greece Present, but no data on status.

Hungary Still present and said to be common in the Kisbálaton on the Hungarian plain.

Ireland Not recorded for over 100 years.

<u>Italy</u>	Recorded in the 1970s, but few recent records and believed to be declining.
<u>Luxembourg</u>	Declining. Still present in small ponds and rivulets a few km south of the city (Hoffman, 1960).
<u>Netherlands</u>	Rediscovered in 1946 after decades of absence (Dresscher and Higler, 1982).
<u>Norway</u>	Reported extinct in 1854, but found at six localities in the south since 1960 (Wells, Pyle and Collins, 1983).
<u>Poland</u>	Originally scattered throughout the country, excluding Upper Silesia and mountainous areas, but intensive collecting has caused a decline in populations. Drainage of marshes in the east also a problem.
<u>Romania</u>	Ten recent records, but no data on status.
<u>Spain</u>	Six recent records, but no data on status.
<u>Sweden</u>	Common in the 19th century but declining ever since. Now known only from a few localities mainly in Scania (in the south) and on the Baltic islands of Öland and Gotland.
<u>Switzerland</u>	Probably still present. No data on status.
<u>Turkey</u>	Present, and collected in large numbers, but no data on status.
<u>United Kingdom</u>	Indeterminate. Once common, but declined in the 19th century; declared extinct in 1910 but isolated records still stand. Five new records since 1982 (Elliott and Tullett, 1984; Sawyer, <u>in litt.</u> , 23.5.86).
<u>USSR</u>	33 records, mainly in southern USSR, Ukraine and Moldavia. Considered to be rare.
<u>Yugoslavia</u>	Present, but no data on status.

Habitat and ecology

In freshwater ponds, streams and marshes, often near farm animals. Tolerant of eutrophic and anoxic conditions. Young leeches feed on frogs and tadpoles; adults suck blood from homiotherms. Life-cycle poorly known, probably two years needed to mature, plus nine months more for reproduction. Cocoons are laid in damp places. Adults are reported to bury themselves in cold weather or dry periods (Wells, Pyle and Collins, 1983).

Reasons for decline

The enormous trade in leeches for blood-letting in the 19th century contributed directly to its present status. A recent revival of interest in H. medicinalis needs to be monitored. The Medicinal Leech is used for the commercial production of the anti-coagulants hirudin, eglin and udellin. World sales of hirudin were ca. £3.5 million at manufacturers selling price in the year to June 1984. £3.2 million of these sales were in

West Germany. The trade in leeches in Germany is on a massive scale, using imports from the wild in south-eastern Europe. An estimated world total of 12 000 kg of leeches are used each year, mainly collected from the wild in Hungary, but also from Bulgaria, Romania, Italy, France, Yugoslavia, Greece and Turkey. As well as being used for anti-coagulant production, leeches are used in increasingly large numbers for improving blood circulation in skin-grafts and other plastic surgery operations. They are also used for educational purposes. Loss of habitat, particularly drainage of marshes and changing agricultural practices, is now a major factor in the species' decline, particularly in the many countries where populations are very reduced. This also contributes to the decline of its initial host, frogs.

Conservation measures taken

Protected in Greece. In 1984 a commercial leech farm was set up in Swansea, UK, with the aim of meeting the demand for anticoagulants and specimens. Both live specimens and biochemical extracts are supplied, the former making up the bulk of the trade. Fifty per cent of production goes to the USA; a further 25 per cent also goes abroad.

No wetland areas are known to have been set aside primarily for conservation of the Medicinal Leech, but one locality in Wales is within a nature reserve.

Conservation measures proposed

Surveys are needed in order to assess the location and security of the most important European localities. Effective protection and management programmes should ensue. Listing on Appendix III of the Bern Convention is desirable, giving some control and monitoring of trade, but more particularly in combatting the decline and loss of prime habitat. The Bern Convention would play an important role in protecting the leech in those parts of Western Europe where populations are already rare and localised.

Captive breeding programmes should be encouraged. Eventually, genetic engineering may obviate the need for use of wild animals, but if a sustainable trade in captive-bred leeches can be demonstrated, this may be unnecessary. A well-monitored programme of trade in H. medicinalis could be a valuable boost to the conservation effort.

The Medicinal Leech will be proposed for Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1987.

10. MARINE INVERTEBRATES AND MINOR PHYLA

This report has concentrated on terrestrial and freshwater invertebrates which, generally speaking, are more seriously threatened than marine species. The latter are often cosmopolitan in distribution and, although impacts such as marine pollution (which can be locally severe in the Mediterranean) causes local declines, the impact is rarely widespread enough to put marine invertebrates into the endangered or vulnerable categories. Some marine invertebrates are useful indicators of pollution. For example, there is a growing literature demonstrating the effects of pollutants in causing range reductions and deformities in echinoderms (Wells, Pyle and Collins, 1983).

Certain marine species and groups are, at least locally, vulnerable to over-exploitation. Although in most cases this is unlikely to endanger the species involved, the trade itself can often be adversely affected and there is a need for greater control of invertebrate fisheries and international control of quotas (see e.g. Hunnam, 1980). Exploitation is normally either for decorative materials or for food. A few examples of the curio and luxury item trade include the following:

- Sponges (Porifera) have been used for centuries for personal and household purposes (mainly Spongia zimocca, S. officinalis and particularly Hippospongia communis). Tunisia is the major exporter (74 tonnes in 1980, over half the world production), with Greece in second place. The Greek fishery has declined due to over-exploitation and protective action by other countries, such as Libya and Egypt, preventing Greek boats from working their territorial waters. Other European exporters include Turkey, Libya, Yugoslavia and Syria (Wells, Pyle and Collins, 1983).
- Red Coral (Corallium rubrum L., 1758), one of the Precious Corals (phylum Cnidaria), used to occur throughout large areas of the Mediterranean, particularly off the coasts of southern France, Corsica, Sardinia, Sicily and North Africa from Tunis to the Straits of Gibraltar (Hickson, 1924), as well as in Cape Verde and the Canary Islands. Although protected in Greece, it is now absent from the Aegean. Small colonies of C. rubrum are still abundant in the Mediterranean, but commercial grade sources are scarce. The Federal Republic of Germany added Red Coral to its protected species list in December 1986, thus preventing trade there. It has been recommended in a recent FAO report that Precious Coral fishing should be carefully regulated (Charbonnier and Garcia, 1984). Listing under CITES may be appropriate.
- The Broad Sea Fan (Eunicella verrucosa), also in the phylum Cnidaria, occurs in the East Atlantic and Mediterranean. Populations were depleted through exploitation for the curio trade but recent conservation education efforts within the diving community have at least temporarily decreased collecting pressure.
- The bryozoan Rose Coral Pentapora foliacea, found in the north-east Atlantic, forms large slow-growing colonies that are attractive, easily dried and preserved, and equally easily over-exploited; P. fascialis in the Mediterranean is similarly vulnerable.

- Pinna nobilis, a large spectacular bivalve, has declined in the Mediterranean through over-collection and is now protected in Greece and Federal Republic of Germany.
- Echinus esculentus (L., 1758), the European Edible Sea Urchin, is over-exploited for the curio trade on parts of the British coast. However, the overall population of this species is large, ranging from northern Norway to northern Portugal and the Canary Islands (not in the Baltic or Mediterranean). At present it is not under serious threat, but the curio trade should be closely monitored, and perhaps terminated in some countries (Wells, Pyle and Collins, 1983). In the UK the curio trade is currently the subject of a major enquiry by the Marine Conservation Society and the University of Exeter.

Over-exploitation of marine invertebrates for food is widespread in the European region. Two examples of particular note are:

- The fisheries for the clawed lobsters, which include some of the most valuable and popular species, are considered to be in serious biological and economic trouble. Stocks of the Norwegian Lobster (Nephrops norvegicus) are being over-fished. Catches of the Common Lobster (Homarus gammarus) in European waters are falling while prices continue to rise (Wells, Pyle and Collins, 1983). Management and control of these fisheries are needed.
- The echinoderm Paracentrotus lividus (Lamarck, 1816) (the Purple Urchin), has long been regarded as a delicacy in France, leading to local over-exploitation and some drastic depletions. It still has a wide range in the Mediterranean and along the shores of France and Britain but carefully controlled commercial exploitation is needed (Wells, Pyle and Collins, 1983).

Marine phyla in European waters which currently appear to be of little conservation concern include the Ctenophora, Chaetognatha, Gnathostomulida, Kinorhyncha, Gastrotricha, Priapulida, Sipuncula, Echiura, Pogonophora, Phoronida, Hemichordata and Brachiopoda. Certain parasitic phyla, notably the Acanthocephala, Mesozoa, Placozoa and Entoprocta are also not known to be under threat.

In many parts of Europe the brackish water invertebrates may be more severely threatened than the marine ones. Some habitats, such as lagoons, are under growing pressure from development and other human impacts. Lagoonal species may be more appropriate for the Bern Convention than strictly marine species. Investigations are needed. A few examples of seashore taxa follow:

- The Zuiderzee Doridella Sea Slug (Doridella batava (Kerbert, 1856)) may be under serious threat, or even extinct. This small, brackish water sea slug is believed to be endemic to an area centred on the Zuiderzee in the Netherlands. The closure of the Zuiderzee caused its disappearance from most known localities, including the type locality (Wells, Pyle and Collins, 1983).
- The Starlet Sea Anemone, Nematostella vectensis Stephenson, 1935, is a species of brackish lagoons and pools, away from the shore-line. Known only from the UK (seven localities), Canada (one locality) and the USA (Pacific and Atlantic coasts), it is classified as vulnerable by Wells, Pyle and Collins (1983). Careful study and conservation measures are required for Nematostella, but it is inappropriate for the Bern Convention since its main range is outside Europe.

The Nemertea (nemertines or ribbon worms) are slender unsegmented worms up to several cm in length. While most are marine, a few are known from brackish, freshwater and even terrestrial environments. The aquatic species are poorly known as regards their conservation status, but some of the terrestrial species have small ranges and are possibly vulnerable to disturbance. One of these, Leptonemertes chalicopora (Graff, 1879), occurs in Madeira, the Azores and the Canary Islands. It occurs in damp, stony shaded habitats from sea level to altitudes of 1000 m (Moore and Moore, 1972) and is classified as rare in the IUCN Invertebrate Red Book in recognition of its limited world range (Wells, Pyle and Collins, 1983). Nevertheless, it is currently believed to be safe in the majority of its known localities and is therefore not suitable for listing on the Bern Convention.

11. INTERPRETATION OF THE BERN CONVENTION

Although the range of threats to invertebrates is similar to that for other wildlife, the emphasis is rather different. As noted in section 3, the taking of a few specimens for study, either at the amateur or professional level, generally does no measurable harm. Indeed the disciplines of entomology, arachnology, malacology and other invertebrate studies usually require the taking of specimens. Nevertheless insects and other invertebrates do not generally attract the organized hunting suffered by some birds and mammals. In certain cases there is a need for restraint by collectors, usually where the species' distribution has already been severely disrupted and reduced, but wholesale alteration or destruction of natural habitat is the real enemy of invertebrate diversity.

Armed with this perspective, it might be useful to offer some guidance to Parties as to the interpretation of the Articles of the Convention for any invertebrate species that might in future be included on the Appendices. A few salient points are listed below and should be read in conjunction with the Text of the Convention (Council of Europe, 1979).

1. Article 3.2 calls for planners and developers to have regard to consideration of all wildlife, but for many people the term 'wildlife' does not evoke thoughts of insects and other invertebrates. Experience in UK is showing that invertebrates do in fact have great potential as indicators of rich conservation sites and environmental perturbation, and could be much more widely used in this way.
2. Article 3.3 makes provision for the promotion of education and dissemination of information. This is particularly important for invertebrates. The European Committee's (1984) document "Giving nature a chance: the Bern Convention" gives the layman a good insight into the purpose and content of the Convention. Once invertebrates are listed on the Appendices, special provision for interpretation to the public will be required.
3. Article 4, concerning protection of habitats, is the vital core of the Convention as far as invertebrates are concerned. Parties should be encouraged to identify important localities for invertebrates to be listed. Surveys could be put in motion even before listing has been completed, in order that the Parties will be ready to honour their obligations once the species are added to the Appendices.
4. The interpretation of Article 6 will require great care for invertebrates, and Parties should give licence for exceptions under Article 9 wherever reasonable purpose can be demonstrated. Article 6.a. must be applied forcefully to commercial concerns, but private collectors or scientists requiring specimens for bona fide research should not be hindered. For example, researchers involved with the Council's project on xylophagous insects may need to take specimens from time to time, and should be allowed so to do. Article 6.e. will be impossible to implement so far as possession is concerned, but trade aspects can be closely controlled and monitored. Bona fide commercial organizations with a good standing in the entomological community may be permitted to trade in old specimens under licence. Recently established or part-time businesses with no reputation to uphold should not be considered for licensing. Organizations interested in farming or ranching listed species should not be unduly

hindered from doing so but, once again, only businesses of high reputation need be considered. The moth Graellsia isabelae, for example, might benefit from a ranching operation in northern Spain.

5. Article 11.2.a. has great potential for effective conservation measures for insects. Reintroductions encourage sensitive management and are of great interest to the general public. The U.K. Joint Committee for the Conservation of British Insects has prepared a "Code of Practice for Insect Re-establishment" (JCCBI, 1986) which, like its predecessor the "Code for Insect Collecting (JCCBI, undated), could become widely adopted.
6. Article 22.1 gives Parties the opportunity to make reservations concerning the species on the Appendices. In some countries one or more of the candidate insects may be common and widespread, while in other countries it may be extremely rare. Where there is debate on the precise conservation status of a species (as is often the case) it may be practicable to list the species on the Appendices but release certain Parties from their responsibilities, on provision of suitable supporting documentation.

12. REFERENCES

- Adam, W. (1944). Notes sur les Gastéropodes. 14. Espèces nouvelles ou rares pour la Belgique. Bull. Mus. Roy. Hist. Nat. Belg. 20(9).
- Aguilar, J. d', Dommanget, J.-L. and Préchac, R. (1985). Guide des Libellules d'Europe et d'Afrique du Nord. Delachaux et Niestlé, Lausanne.
- Allenspach, V. (1970). Insecta Helvetica Catalogus 2. Coleoptera: Scarabeidae, Lucanidae. Druck, Zurich.
- Allenspach, V. (1973). Insecta Helvetica Catalogus 3. Coleoptera: Cerambycidae. Druck, Zurich.
- Andre, J. (19??). Biogeographic organization of terrestrial mollusc populations in the Iberian and French Mediterranean area. (Abstract).
- Angus, R.B. (1976). A preliminary note on the British species of Graphoderus Sturm, with the additions of G. bilineatus Degeer and G. zonatus Hoppe to the British list. Balfour-Browne Club Newsletter 1: 1-3.
- Anon (1980). Environmental conservation in Gibraltar. Report on conservation of the natural environment in Gibraltar. The Gibraltar Environmental Group.
- Anon. (1933). Gesetz vom 3 Juli 1933 Über den Schutz der Natur (Naturschutzgesetz). Liechtensteinisches Landes-Gesetzblatt 11, p. 10.
- Anon. (1975). In Luxemburg geschützte Tiere. Natura, Luxembourg.
- Anon. (1979). Liste der gefährdeten Pflanzen- und Tierarten im Bezirk Cottbus. Rat des Bezirkes Cottbus Abteilung Forstwirtschaft Bezirksarbeitsgruppe Artenschutz. 48 pp.
- Anon. (1980). Shame on the collectors. Oryx 15: 432.
- Anon. (1982). Rote Listen der Pflanzen und Tiere Schleswig-Holsteins. Schriftenreihe des Landesamtes für Naturschutz und Landschaftspflege Schleswig-Holstein, Heft 5, Kiel. 149 pp.
- Anon. (1983). Rote Liste bedrohter Tiere in Bayern (Wirbeltiere, Insekten, Weichtiere). Bayerisches Staatsministerium für Landesentwicklung und Umweltfragen. 40 pp.
- Ant, A. (1976). Arealveränderungen und gegenwärtiger Stand der Gefährdung mitteleuropäischer Land und Süßwassermollusken. Schriftenreihe für vegetationskunde 10(S.309): 309-339.
- Ant, H. (1976). Arealveränderungen und gegenwärtiger Stand der Gefährdung mitteleuropäischer Land- und Süßwassermollusken. Schriftenreihe für Vegetationskunde 10: 309-339.

- Baeta Neves, C.M. (1959). Protection des animaux rares et menacés au Portugal. In Animaux et Végétaux Rares de la Région Méditerranéenne. La Terre et la Vie Supplement.
- Bannikov, A.G. and Sokolov, V.I. (Eds) (1984). The Red Data Book of the USSR. Rare and Threatened Species of Animals and Plants. Lesnaya Promiishlyennost Press, Moscow. (In Russian.)
- Baraud, J. (1977). Coléoptères Scarabaeoidea. Faune de l'Europe Occidentale: Belgique, France, Grande Bretagne, Italie, Péninsule Ibérique. Supplément à la Nouvelle Revue d'Entomologie 7(1).
- Bauer, G. and Eicke, L. (1986). Pilotprojekt zur Rettung der Flussperlmuschel. Natur und Landschaft 61(4): 140-143.
- Bernardi, G. (1963). La réhabilitation du Lycaena dispar dit du Saint-Quentin. Alexanor 3: 9-16; 51-59, 2 figs, 2 pls.
- Bernardi, G. (1979). Lépidoptères protégés. Sciences Nat. Bulletin 24: 12-14.
- Bernardi, G., Nguyen, T. and Nguyen, T.H. (1981). Inventaire, cartographie et protection des Lépidoptères en France. Beiheft Veröffentlichungen Naturschutz. Landschaftspflege Baden-Württemberg 21: 59-66.
- Bink, F.A. (1972). Het onderzoek naar de grote vuurvliinder (Lycaena dispar batava Oberthür) in Nederland (Lep. Lycaenidae) Ent. Ber. Aust. 32: 225-239.
- Björk, S. (1962). Investigations on Margaritifera margaritifera and Unio crassus. Acta Limnologica 4: 1-109.
- Blab, J. and Kudrna, O. (1982). Hilfsprogramm für Schmetterlinge. Naturschutz Aktuell. Kilda-Verlag, Greven. 135 pp.
- Blab, J., Nowak, E. and Trautmann, W. (1981). Rote Liste der gefährdeten Tiere und Pflanzen in der Bundesrepublik Deutschland. Naturschutz Aktuell No. 1. Kilda-Verlag, Greven. 66 pp.
- Blab, J., Nowak, E., Trautmann, W. and Sukopp, H. (1984). Rote Liste der gefährdeten Tiere und Pflanzen in der Bundesrepublik Deutschland. Naturschutz Aktuell Nr. 1.
- Boettger, C.R. (1936). Das Vorkommen der Landschnecke Vertigo (V.) moulinsiana Dup. in Deutschland und ihre zoogeographische Bedeutung. Sitzungsber. Ges Naturf. Fr. Berlin 15 August: 101-113.
- Boettger, O. (1889). Die Entwicklung der Pupa - Arten des Mittelrheingebietes in Zeit und Raum. Jahrb. Ver. Nassau 42 (6-7): 225-327.
- Bonnet, P. (1930). Etude des Dolomedes d'Europe. Ph.D. Thesis, Toulouse. Reprinted by Imprimerie Toulousaine. 464 pp.

- Borg, P. and Malmström, K. (1975). Endangered animals and plants in Finland (in Finnish) Luonnon Tutkija 79: 33-43.
- Bourgogne, J. (1971). Un témoignage de plus sur la destruction de la nature (Papilionidae). Alexanor 7: 50.
- Bourgogne, J. (1975/76). Mesures de protection en faveur de Graellsia isabellae (Atacidae). Alexanor 9(5): 205-7.
- Breuning, Dr. (1978). Monographie du Genre Carabus. Supplément à la Nouvelle Revue d'Entomologie 8(1), 355 pp.
- Burckhardt, D., Gfeller, W. and Müller, H.U. (1980). Animaux Protégés de Suisse. Ligue Suisse pour la Protection de la Nature, Basle. 224 pp.
- Burton, G.N. (1980). French insects now protected. Bulletin of the Amateur Entomologists' Society 39: 58-59.
- Butot, L.J.M. (1981). The threatened species of Molluscs in the Netherlands I. The Malacofauna of South-Limburg. Report to IUCN Conservation Monitoring Centre.
- Butot, L.J.M. (1982). The threatened species of Molluscs in the Netherlands II. The terrestrial gastropods in the Netherlands and a list with notes on distribution and degree of threat. Unpub. report to CMC.
- Butot, L.J.M. and Neuteboom, W.H. (1958). Over Vertigo moulinsiana (Dupuy) en haar voorkomen in Nederland. Basteria 22 (2&3): 52-63.
- Cantrall, I.J. (1972). Saga pedo (Pallas) (Tettigoniidae: Saginae), an old world katydid, new to Michigan. The Great Lakes Entomologist 5(3): 103-106.
- Caputa, A., Holcik, J. and Berger, Z. (1982). Atlas Chranenych Zivocichov Slovenska. Obzor, Bratislava. 435 pp.
- Casale, A., Sturani, M., and Taglianti, A.V. (1982). Fauna d'Italia. 18. Coleoptera Carabidae 1. Introduzione, Paussinae, Carabinae. Edizioni Calderini, Bologna. 499 pp.
- Charbonnier, D. and Garcia, S. (1984). Report of the GFCM technical consultation on Red Coral resources of the western Mediterranean and their rational exploitation. FAO Fisheries Report No. 306. 142 pp.
- Cobos, A. (1953). Nota acerca de la presencia des Buprestis (Cypriacis) splendens F. en Espana y de la validez especifica del mismo. Boll. Ass. Romana Ent. 8: 27-33.
- Cobos, A. (1986). Fauna Iberica de Coleopteros, Buprestidae. Consejo Superior de Investigaciones Cientificas, Madrid.
- Collins, N.M. (1985). International trade in swallowtail butterflies. Bulletin of the Amateur Entomologists' Society 44: 64-76.

- Collins, N.M. and Morris, M.G. (1985). Threatened Swallowtail Butterflies of the World. The IUCN Red Data Book. IUCN, Gland and Cambridge. vii + 401 pp, + 8 pls.
- Collins, N.M. and Thomas, J.A. (1985). Why this decline? Naturopa 49: 23-27.
- Commissie voor Inventarisatie en Natuurbescherming (1978). Commentaar op de natuurbeschermingswetgeving. Entomologische Berichten 38(1): 113-118.
- Commissie voor Inventarisatie en Natuurbescherming (1980). Enkele resultaten van de enquête naar de Nederlandse dagvlinders. Entomologische Berichten 40: 57-59.
- Cortés J.E. (1978). Conservation - a future? Reserve Management Plan for Gibraltar.
- Council of Europe (1979). Explanatory Report Concerning the Convention on the Conservation of European Wildlife and Natural Habitats. Council of Europe, Strasbourg. 45 pp.
- D'Ornano, M. and Mehaignerie, P. (1979). Liste des insectes protégés en France. Journal Officiel de la République Française, 22 August.
- Dabrowski, J.S. (1980). The protection of the lepidopterofauna - the latest trends and problems. Nota Lepidopterologica 3(3-4): 114-118.
- Dabrowski, J.S. and Krzywicki, M. (1982). Ginace I Zagrozone Gatunki Motyli (Lepidoptera) W Faunie Polski. Czesc 1: Papilionoidea, Hesperioidea and Zygaenoidea. Polska Akademia Nauk, Zaklad Ochrony Przyrody I Zasobow Naturalnych. Panstwowe Wydawnictwo Naukowe, Warszawa-Krakow. 171 pp (with English summary).
- Daguzan, J. (1980). Contribution à l'étude de la croissance de Elona quimperiana (de Férussac) (Gasteropode Pulmone Stylommatophore) vivant en Bretagne occidentale. Haliotis 10(2): 41.
- Demelt, C. (1966). II. Bockkäfer oder Cerambycidae 1. Biologie mitteleuropäischer Bockkäfer (Col. Cerambycidae) unter besonderer Berücksichtigung der Larven. Die Tierwelt Deutschlands 52(2).
- Dresscher, T.G.N. and Higler, L.W.G. (1982). De Nederlandse Bloedzuigers. Hirundinea. Wetenschappelijke Mededelingen. Koninklijke Nederlandse Naturhistorische Vereniging 154: 64 pp.
- Duffey, E. (1968). Ecological studies on the large copper butterfly Lycaena dispar Haw. batavus Obth. at Woodwalton Fen National Nature Reserve, Huntingdonshire. Journal of Applied Ecology 5: 69-96.
- Duffey, E. (1977). The re-establishment of the large copper butterfly Lycaena dispar batava Obth. on Woodwalton Fen nature reserve, Cambridgeshire, England, 1969-1973. Biological Conservation 12: 143-158.

- Duffey, E. (1982). National Parks and Reserves of Western Europe. Macdonald, London. 288 pp.
- Dumon, D. (1975/76). Elevage de Graellsia isabellae (Atacidae). Alexanor 9(5): 205-7.
- Dumont, H.J. (1971). Need for protection of some European dragonflies. Biological Conservation 3: 223-228.
- Dyduch, A. (1980). Terrestrial malacofauna (Gastropoda Terrestria) of some plant communities in the Bialowieza National Park and the Niepolomice Forest. Ochrona Przyrody 43: 223-272.
- Ehnström, B. (1978). Genom det moderna skogsbruket hotade insektarter. Norwegian J. Entomol. 25: 77-78.
- Ehnström, B. (1985). In litt., 26 February.
- Elliott, J.M. and Tullett, P.A. (1984). The status of the Medicinal Leech Hirudo medicinalis in Europe and especially in the British Isles. Biological Conservation 29: 15-26.
- Else, G., Felton, J. and Stubbs, A. (1979). The Conservation of Bees and Wasps. Nature Conservancy Council, Peterborough. 13 pp.
- Engelhardt, W. (1954). Naturschutz Seine Wichtigsten Grundlagen und Forderungen. Bayerischer Schulbuch-Verlag, Munich. 65 pp.
- European Committee for the Conservation of Nature and Natural Resources (1984). Giving Nature a Chance: the Bern Convention. Council of Europe Environment and Natural Resources Division, Strasbourg. 36 pp.
- Fazekas, I. (1983). Katalog der geschützten Schmetterlinge Ungarns. Nota Lepidopterologica 6(1): 53-56.
- Ferens, B. (1957). Animal Species Under Protection in Poland. National Protection Research Centre of the Polish Academy of Science, Krakow, translated and published in 1965 by the U.S. Dept. of the Interior.
- Foster, A. (1983). National Review of Non-marine Molluscs. Invertebrate Site Register Report 4. NCC, Chief Scientist Team.
- Freude, H., Harde, K.W. and Lohse, G.A. (1966). Die Käfer Mitteleuropas 9. Cerambycidae, Chrysomelidae. Goecke and Evers, Krefeld.
- Freude, H., Harde, K.W. and Lohse, G.A. (1969). Die Käfer Mitteleuropas 8. Terebrantia, Heteromera, Lamellicornia. Goecke and Evers, Krefeld.
- Gangwere, S.K. and de Viedma, M.G. (1984). Informe preliminar sobre el libro rojo de los ortopteros Ibericos. Boletin de la Estacion Central de Ecologia 13(26): 93-98.

- Gangwere, S.K., de Viedma, M.G. and Llorente, V. (1985). Libro Rojo de Los Ortopteros Ibericos. Instituto Nacional para la Conservacion de la Naturaleza, Madrid, Monografias 41, 91 pp. + Xl pls.
- Gepp, J. (1981). ^u Programmrahmen für einen umfassenden Lepidopterenschutz. Beiheft Veröffentlichungen Naturschutz. Landschaftspflege Baden-Württemberg 21: 191-216.
- Gepp, J. (1981). ^l Rote Listen Gefährdeter Tiere der Steiermark. Sonderheft Nr. 3 des Steirischen Naturschutzbriefes. Herausgegeben im Auftrag und Verlag des Österreichischen Gesellschaft für Natur- und Umweltschutz, Graz.
- Gepp, J. (1983). Rote Listen Gefährdeter Tiere Österreichs. Bundesministeriums für Gesundheit und Umweltschutz, Wien. 242 pp.
- Gepp, J. (Ed.) (1985). Gefährdungssituation der Mollusken im Alpenraum. Oesterreichische Akademie der Wissenschaften, Graz, Austria.
- Germain, L. (1930). Mollusques terrestres et fluviatiles. 1ère partie. Faune de France 21: 446. Paris.
- Gfeller, W. (1975). Geschützte Insekten in der Schweiz. Bulletin de la Société Entomologique Suisse 48: 217-223.
- Gittenberger, E. (1983). In litt.
- Gittenberger, G. (1979). On Elona (Pulmonata, Elonidae fam. nov.) Malacologia 18: 139-145.
- Glowacinski, Z., Bieniek, M., Dyduch, A., Certychowa, R., Jakubiec, Z., Kosiov, A. and Zemanek, M. (1980). Situation of All Vertebrates and Selected Invertebrates in Poland - List of Species, Their Occurrence, Endangerment and Status of Protection. Polska Akademia Nauk, Studia Naturae Seria A, Nr. 21. 85 pp. (In Polish with English headings).
- Gomez-Bustillo, M.R. (1981). Protection of Lepidoptera in Spain. Beiheft Veröffentlichungen Naturschutz. Landschaftspflege Baden-Württemberg 21: 67-72.
- Gomez-Bustillo, M.R. and Fernandez-Rubio, F. (1974). Mariposas de la Peninsula Iberica (tomo 3). Servicio de Publicaciones del Ministerio de Agricultura, Madrid.
- Group of Consultants for Invertebrates (1983). Draft "General Statement on Invertebrates" prepared by M.C.D. Speight. 10 pp.
- Haas, F. (1929). Fauna malacologica terrestre y de agua dulce de Cataluna. Treb. Mus. Cienc. Nat. Barcelona 13: 310-311.
- Hansen, V., Klefbeck, E., Sjöberg, O., Stenius, G., Strand, A. and Lindroth, C. (1960). Catalogus Coleopterorum Fennoscandiae et Daniae. Entomologiska Sällskapet I Lund. 476 pp.

- Harde, K.W., Hammond, P.M. and Severa, F. (1984). A Field Guide in Colour to Beetles. Octopus, London. 334 pp.
- Harding, P.T. (Ed.) (1985). Woodlice in Britain and Ireland: Distribution and Habitat. NERC/ITE, Huntingdon. 151 pp.
- Harding, T. (1985). Current Atlases of the Flora and Fauna of the British Isles 1985. Biological Records Centre, Institute of Terrestrial Ecology, Monks Wood, UK.
- Harz, K. (1976). The Orthoptera of Europe. 3 volumes. W. Junk, The Hague.
- Harz, K. and Kaltenbach, A. (1976). The Orthoptera of Europe. Vol. III. Junk, The Hague. 434 pp.
- Heath, J. (1971). The European invertebrate survey. Acta Entomologica Fennica 28: 27-29.
- Heath, J. (1973). The European Invertebrate Survey. Malacologia 14: 411-413.
- Heath, J. (1977). European Invertebrate Survey - progress report 1971-74. Malacologia 16: 141-142.
- Heath, J. (1981). Insect conservation in Great Britain (including a code for insect collecting). Beiheft Veröffentlichungen Naturschutz. Landschaftspflege Baden-Württemberg 21: 219-223.
- Heath, J. (1981b). Threatened Rhopalocera (Butterflies) of Europe. Council of Europe, Strasbourg. 157 pp.
- Heath, J. (Ed.) (1973-1979). Provisional Atlas of the Insects of the British Isles. Biological Records Centre, Monks Wood, Huntingdon.
- Heath, J. and Leclercq, J. (Eds) (1981). Provisional Atlas of the Invertebrates of Europe. Maps 1-27. Institute of Terrestrial Ecology, Monks Wood, Huntingdon and Faculté des Sciences Agronomiques, Gembloux.
- Heath, J., Pollard, E. and Thomas, J.A. (1984). Atlas of Butterflies in Britain and Ireland. Viking/Penguin, Harmondsworth and New York. 158 pp.
- Heideman, H. (1974). Ein neuer Fund von Coenagrion hylas. Odonatologica 3: 181-185.
- Hertel, R. (1959). Die Flussperlmussel (Margaritifera margaritifera L.) in Sachsen. Abh. Ber. staatl. Mus. Tierkunde Dresden 24: 57-82.
- Hesse, P. (1916). Zur Kenntnis der Molluskenfauna von Ostrumelien. Nachr. bl. D. mal. Ges. 48: 119.
- Hickson, S.J. (1924). An Introduction to the Study of Recent Corals. University Press, Manchester.

- Higgins, L.G. and Riley, N.D. (1980). A Field Guide to the Butterflies of Britain and Europe. Fourth edition. Collins, London. 384 pp.
- Hoffman, J. (1960). Notules hirudinologiques, II. Nouvelle station de Hirudo medicinalis au Grand-Duché. Inst. Grand-Ducal, Section des Sciences naturelles, physiques et mathématiques, Archives N.S.27: 289.
- Holyoak, D.T. (1978). Effects of atmospheric pollution on the distribution of Balea perversa (Linnaeus) (Pulmonata: Clausiliidae) in southern Britain. Journal of Conchology 29: 319-323.
- Holyoak, D.T. (19??). Distribution of land and freshwater mollusca in Corsica.
- Horion, A. (1941). Faunistik der Deutschen Käfer. Band I: Adepnaga-Caraboidea. Düsseldorf. 464 pp.
- Horion, A. (1958). Faunistik der Mitteleuropäischen Käfer. Band VI: Lamellicornia (Scarabaeidae-Lucanidae). Feyel, Überlingen-Bodensee. 343 pp.
- Horion, A. (1960). Faunistik der Mitteleuropäischen Käfer. Band VII: Clavicornia 1. Teil (Sphaeritidae bis Phalacridae). Feyel, Überlingen-Bodensee. 346 pp.
- Horion, A. (1974). Faunistik der Mitteleuropäischen Käfer. Band XII: Cerambycidae-Bockkäfer. Überlingen-Bodensee. 228 pp.
- Hunnam, P.J. (1980). Mediterranean species in possible need of protection. Unpublished report by Aquatic Biological Consultancy Services Ltd for IUCN.
- Ingrish, S. (1985). Orthoptera. Naturopa 49: 20-22.
- International Bee Research Association et al. (1980). Atlas of the Bumblebees of the British Isles. Institute of Terrestrial Ecology, Cambridge, 32 pp.
- Itzerott, H., Niehuis, M., Weitzel, M., Kikillus, R., Ohliger, S. and Schmidt, E. (1985). Rote Liste Libellen. Rheinland Pfalz, Ministerium für Soziales, Gesundheit und Umwelt. 23 pp.
- JCCBI (1982). Draft resolution on legislation. AES Insect Conservation News 5: 17.
- JCCBI (1986). Insect re-establishment - a code of conservation practice. Antenna 10(1): 13-18.
- JCCBI (undated). A code for insect collecting. London, Royal Entomological Society and JCCBI. 4 pp.
- Janssens, A. (1960). Faune de Belgique. Insectes. Coléoptères Lamellicornes. Institut Royal des Sciences Naturelles de Belgique, Bruxelles.

- Jones, D. (1983). The Country Life Guide to Spiders of Britain and Northern Europe. Country Life, Hamlyn, Feltham! 302 pp.
- Jungbluth, J.H. (1978). Rote Liste der Bestandsgefährdeten Schnecken und Muscheln Hessens. Hessische Landesanstalt für Umwelt.
- Kennard, A. (1974). Where have all the insects gone? Country Life March 28: 10-11.
- Kerney, M. (in prep.) Atlas of Non-Marine Molluscs of the British Isles. 2nd Edition.
- Kerney, M.K. (1982). The mapping of non-marine Mollusca. Malacologia 22: 403-407.
- Kerney, M.K. and Stubbs, A. (1980). The Conservation of Snails, Slugs and Freshwater Mussels. Nature Conservancy Council, Peterborough
- Kerney, M.P. (1975). European distribution maps of Pomatias elegans (Müller), Discus rudersatus (Férussac), Eobania vermiculata (Müller) and Margaritifera margaritifera (Linné). Arch. Moll. 106(4/6): 243-249.
- Kerney, M.P. (1976). Atlas of Non-marine Mollusca of the British Isles. Conchological Society of Great Britain and Ireland, Natural Environment Research Council.
- Kerney, M.P. and Cameron, R.A.D. (1979). A Field Guide to the Land Snails of Britain and North-west Europe. Collins, London.
- Kerney, M.P., Cameron, R.A.D. and Jungbluth, J.H. (1983). Die Landschnecken Nord- und Mitteleuropas. Paul Parey, Hamburg and Berlin.
- Klemm, C. de (1985). The legal protection of insects in Europe. Report to the Council of Europe, 55 pp.
- König, F. (1981). Allgemeine Betrachtungen über die Vergangenheit, Gegenwart und Zukunft der rumänischen Lepidopterenfauna. Beiheft Veröffentlichungen Naturschutz. Landschaftspflege Baden-Württemberg 21: 73-78.
- Kvamme, T. and Hagvar, S. (1985). Truete og sårbare insekter i norske skogsmiljøer. (Endangered and vulnerable insect species in Norwegian forests). Norsk Institutt for Skogsforskning, As. Rapport T-592. 89pp.
- LOLF (1979). Rote Liste der in Nordrhein-Westfalen Gefährdeten Pflanzen und Tiere. Landesanstalt für Ökologie, Landschaftsentwicklung und Forstplanung NW, Recklinghausen, Nordrhein-Westfalen. 109 pp.
- Leclercq, J. (Ed.) (1971 et seq.). Atlas Provisoire des Insectes de Belgique. Faculté des Sciences Agronomiques de l'Etat, Gembloux.

- Leclercq, J., Gaspar, C., Marchal, J.-L., Verstraeten, C. and Wonville, C. (1980). Analyse des 1600 premières cartes de l'atlas provisoire des insectes de Belgique, et première liste rouge d'insectes menacés dans la faune Belge. Note Fauniques de Gembloux No. 4. Faculté des Sciences Agronomiques de l'Etat, Gembloux. 103 pp.
- Lepidopterists' Society (1982). Statement of the Committee on Collecting Policy. News of the Lepidopterists' Society 5.
- Lhomme, L. (1923-35). Catalogue des Lépidoptères de France et de Belgique. Société Entomologique de France, Lot. 800 pp.
- Lieftinck, M.A. (1964). Aantekeningen over Coenagrion hylas (Trybom) in Midden Europa (Odonata, Coenagrionidae). Tijdschrift voor Entomologie 108: 41-59.
- Lieftinck, M.A. (1965). Macromia splendens (Pictet, 1843) in Europe, with notes on its habitat, larva and distribution (Odonata). Tijdschrift voor Entomologie 108: 41-59.
- Lozek, V. (1956). Vertigo moulinsiana (Dupuy) in Czechoslovakia. Basteria 20: 12-17.
- Lyster, S. (1985). International Wildlife Law. Grotius, Cambridge. 471 pp.
- Malaus, J.-C. (1978). L'élevage d'une espèce en voie d'extinction en vue d'assurer sa protection: Sellaecarabus olympiae (Sella) (Col. Carabidae). Bulletin de la Société Entomologique de France 83: 153-159.
- Malaus, J.-C., Raviglione, M.C. and Boggio, F. (1983). Il Carabus Olympiae Sella dell'Alta Valle Sessera. Pro Natura Biellese, Biella. 107 + iv pp.
- Manley, W.B.L. and Allcard, H.G. (1970). A Field Guide to the Butterflies and Burnets of Spain. Classey, U.K. 192 pp. + 40 col. pls.
- Marquet, B. (1985). La sangsue médicinale Hirudo medicinalis (L.) une espèce dont le statut est incertain en Belgique. Les Naturalistes Belges 66(2): 33-42.
- Marren, P. (1986). The lethal harvest of crayfish plague. New Scientist 1493 (30 January).
- Mermod, G. (1930). Gastéropodes. Cat. Invert. Suisse. Vol. 18.
- Meyer, M and Pelles, A. (1979). Rote Liste der Schmetterlinge Luxembourgs. Paiperlek 1(2): 1-9.

- Meyer, M. and Pelles, A. (1982). Rote liste der Schmetterlinge Luxemburgs. Soc. Nat. Lux. Bull. 83/84: 41-52.
- Mikkola, K. (1979). Vanishing and declining species of Finnish Lepidoptera. Notulae Entomologicae 59: 1-9.
- Mikkola, K. (1981). Ausgestorbene und aussterbende Schmetterlinge in Finnland. Beiheft Veröffentlichungen Naturschutz. Landschaftspflege Baden-Württemberg 21: 19-22.
- Mol, A.W.M. (1981). Some preliminary notes on the distribution patterns of Ephemeroptera in the Netherlands. In van Tol, J. and van Helsdingen, P.J., pp. 67-71.
- Morales Agacino, E. (1959). Sobre una nueva especie del genero Canariola Uvavov (Orth. Tettigoniidae). Revista Espanola de Entomologia (EOS) 35 (3): 269-277.
- Morris, M.G. (1976). Conservation and the collector. In: Heath, J. (Ed.), The Moths and Butterflies of Great Britain and Ireland Vol. 1, pp 107-116. London, Curwen Press and Blackwell Scientific Publications.
- Morris, M.G. (1981). Conservation of butterflies in the United Kingdom. Beiheft Veröffentlichungen Naturschutz. Landschaftspflege Baden-Württemberg 21: 35-47.
- Mühle, H. (1981). Relikt-Arlen (Coleoptera, Buprestidae). Entomofauna, Zeitschrift für Entomologie 2(25): 303-306.
- Muntingh, H. (1983). Written question No. 2345/82 to the Commission of the European Communities. Official Journal of the European Communities No. C137/1, 25 May 1983.
- Nestorova, E. and Slivov, A. (1985). On the rare and protected by law species of superfamily Papilionoidea from Bulgaria (in Bulgarian with English summary). Int. Symp. Protection of Natural Areas and the Genetic Fund They Contain", Project No. 8, Man and the Biosphere (MAB) of UNESCO, 23-28 Sept 1985, Blagoevgrad, Bulgaria. Collection of reports, Sofia, BAS, pp. 278-280.
- New, T.R. (1984). Insect Conservation - An Australian Perspective. Junk, The Hague. xiii + 184 pp.
- Newman, L.H. (1965). Hawk-Moths of Great Britain and Europe. Cassell, London. 148 pp.
- Newman, P.M. (1964). A new species of Canariola Uvarov from Spain (Orth. Tettigoniidae). Revista Espanola de Entomologia (EOS) 40: 229-233.
- Novak, I. and Spitzer, K. (1982). Ohrozeny svet hmyzu (Endangered World of Insects). Ceskoslovenska Akademie Ved, Prague. 138 pp.

- Okland, K.A. and Kuiper, J.G.J. (1982). Distribution of small mussels (Sphaeriidae) in Norway, with notes on their ecology. Malacologia 22(1-2): 469-477.
- Palik, E. (1981). The conditions of increasing menace for the existence of certain Lepidoptera in Poland. Beiheft Veröffentlichungen Naturschutz. Landschaftspflege Baden-Württemberg 21: 31-33.
- Parker, S.P. (Ed) (1982). Synopsis and Classification of Living Organisms. McGraw Hill, 2 vols., 1232 pp.
- Paulian, R. and Baraud, J. (1982). Faune des Coléoptères de France II. Lucanoidea et Scarabaeoidea. Lechevalier, Paris.
- Pintér, L., Richnovsky, A. and Szigethy, A. (1979). Distribution of the recent Mollusca of Hungary. Soosiana, Suppl. 1.
- Pittaway, A.R. (1983). An annotated checklist of the western Palaearctic Sphingidae (Lepidoptera). Entomologist's Gazette 34: 67-86.
- Rappaz, R. (1979). Les Papillons du Valais. Imprimerie Pillet, Martigny. 377 pp. + 9 col. pls.
- Real, G. and Testud, A-M (1980). Données préliminaires sur les mollusques continentaux protégés ou réglementés en France. Haliotis 10(1): 75-86.
- Reichl, E.R. (1975). Zoodat - die tiergeographische Datenbank Österreichs. Verh. des Sechsten Int. Symp. über Entomofaunistik in Mitteleuropa. Junk, The Hague, 143-163.
- Roesler, R.U. and Spiedel, W. (1979). Rote liste der in Baden-Württemberg gefährdeten Zünslerfalter (Pyraloidea) (Lepidoptera-Schmetterlinge). Veröff Naturschutz Landschaftspflege Baden-Württemberg 49/50: 371-395.
- Rotarides, M. and Weis, T. (1950). Pripevik k mäkkysej faune Mollusca Bardejova a jeho okolia Priroda. Turc Martin 5(10): 145-147.
- Rothschild, W. and Jordan, K. (1903). A revision of the lepidopteran famiy Sphingidae. Novitates Zoologicae 9. Supplement (2 vols.).
- Sacchi, C.F. (19??). Ecological and historical bases for a study of the Iberian terrestrial mollusca. Proc. 1st Europ. Malac. Congr.
- Schlesch, H. (1943). Studies over Land mollusken. 2. Vertigo moulinsiana Dupuy, Basteria 8: 48-49.
- Schmidt, E. (1977). Ausgestorbene und bedrohte Libellenarten in der Bundesrepublik Deutschland. Odonatologica 6: 97-103.

- Secretariat de la Faune et de la Flore (1983). Objectifs et fonctionnement; méthodologie et déontologie; programmes et publications. Secretariat de la Faune et de la Flore, Muséum National d'Histoire Naturelle, Paris. 38 pp.
- Seitz, A. (Ed.) (1913). The Macrolepidoptera of the World. Vol. II. The Palearctic Bombyces and Sphinges. Stuttgart. 479 pp.
- Seixas, M.M.P. (1981). Contribuicao para o conhecimento dos gasteropodes dos Açores. Arq. Mus. Boc. (Série B) 1(11): 133-144.
- Shirt, D.B. (Ed.) (in press). British Red Data Books 2: Insects. Nature Conservancy Council, Peterborough.
- Snazell, R. (1986). The spider genus Macrothele Ausserer in Spain (Araneae; Dipluridae). Bulletin of the British Ecological Society 17(2): 80-83.
- Stubbs, A.E. (1972). Wildlife conservation and dead wood. Supplement, Quart. J. Devon Trust for Nature Conservation, 18 pp.
- Stubbs, A.E. (1981). Loss of Lepidoptera habitat in Britain: part of a European problem. Beiheft Veröffentlichungen Naturschutz. Landschaftspflege Baden-Württemberg 21: 49-58.
- Svensson, I. (1981). Changes in the Lepidoptera fauna of Sweden after Linnaeus. Beiheft Veröffentlichungen Naturschutz. Landschaftspflege Baden-Württemberg 21: 22-23.
- Szczepanski, W. (undated). Anthills of the Formica rufa group and the unfavourable impact of industry in the Forest Protective Belt of the Upper Silesian Industrial District. Warsaw Agricultural University 2nd Symposium on the Protection of Forest Ecosystems: 95-107.
- Tanasiychuk, V.N. (1981). Data for the 'Red Book' of insects of the USSR Entomologicheskoye Obozreniye 60: 168-186. (English translation).
- Tassi, F. (1969). Problemi di conservazione nel campo dell'entomologia. Memorie della Società Entomologica Italiana 48: 609-626.
- Tassi, F. (1972). Gli insetti nella protezione della natura. (Insects in nature conservation). Atti del 9 Congresso Nazionale Italiano di Entomologia, Siena, 21-25 June 1972. 17 pp. + 5 pls.
- Thake, M.A. (1985). Preliminary list of endangered molluscan species. Unpub. list compiled for Environment Division, Dept. of Health, Marsa, Malta.
- Thomas, J.A. (1984). The behaviour and habitat requirements of Maculinea nausithous (The Dusky Large Blue butterfly) and M. teleius (the Scarce Large Blue) in France. Biological Conservation 28: 325-347.

- Turner, H. and Wuthrich, M. (1985). Systematic Catalogue of Swiss Mollusca. Swiss Federal Institute of Forestry Research, Birmensdorf, Switzerland. Second Edition.
- Väisänen, R. (1982). Vanishing and vulnerable Diptera of Finland. Notulae Entomologicae 62: 111-121.
- Väisänen, R., Suomalainen, E. and Luoma, H. (1983). The occurrence and protection of Lycaena dispar (Lepidoptera, Lycaenidae) in Finland. Notulae Entomologicae 63: 124-126.
- Valletta, A. (1980). The butterflies of the Maltese Islands and their dwindling habitats. Nota Lepidopterologica 2: 165-166.
- van Goethem, J. (1983). In litt. March 1st.
- van Tol, J. and Van Helsdingen, P.J. (Eds) (1981). Methods and results of E.I.S. mapping schemes in the Netherlands. Nieuwsbrief European Invertebrate Survey - Nederland 10, 103 pp.
- van Tol, J. and Verdonk, M.J. (in prep.). The Protection of Dragonflies and their Biotopes. Council of Europe, Nature and Environment Series.
- Viedma, M.G. de and Gomez Bustillo, M.R. (1976). Libro Rojo de los Lepidopteros Ibericos. Instituto Nacional para la Conservacion de la Naturaleza, Publicaciones del Ministerio de Agricultura Secretaria General Técnica, Madrid. 117 pp (with English summary).
- Viedma, M.G. de, and Gomez-Bustillo, M.R. (1985). Revision de Libro Rojo de los Lepidopteros Ibericos. Instituto Nacional para la Conservacion de la Naturaleza. Monografias 42, 71 pp. + 3 col. pls. Madrid.
- Viedma, M.G. de, Gomez Bustillo, M.R. and Gomez de Aizpurna, C. (1980). Mariposas que necesitan proteccion. Disputacion Provincial de Madrid, Servicio Forstal. 8 pp.
- Villiers, A. (1978). Faune des Coléoptères de France I. Cerambycidae. Lechevalier, Paris. xxvii + 611 pp.
- Walden, H.W. (1984). On the origin, affinities and evolution of the land Mollusca of the mid-Atlantic Islands with special refernce to Madeira. Bol. Mus. Mun. Funchal 36(158): 51-82.
- Wells, S.M., Pyle, R.M. and Collins, N.M. (1983). The IUCN Invertebrate Red Data Book. IUCN, Gland and Cambridge, L + 632 pp.
- Westerlund, C.A. (1887). Fauna der in der paläarktischen Region lebenden Binnenconchylien. III Lund. p. 136.
- Zahradnik, J. (1977). A Field Guide in Colour to Insects. Octopus, London. 319 pp.

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14. SUMMARY LIST OF INVERTEBRATE CANDIDATES FOR THE BERN CONVENTION

Species	Appendix	Status
Arthropoda		
Insecta		
Dictyoptera: Mantodea		
1. <u>Apteromantis aptera</u>	II	Endangered
Odonata: Zygoptera		
2. <u>Coenagrion freyi</u>	II	Endangered
3. <u>Coenagrion mercuriale</u>	II	Endangered
4. <u>Calopteryx syriaca</u>	II	Endangered
Odonata: Anisoptera		
5. <u>Ophiogomphus cecilia</u>	II	Endangered
6. <u>Stylurus (=Gomphus) flavipes</u>	II	Endangered
7. <u>Aeshna viridis</u>	II	Endangered
8. <u>Oxygastra curtisii</u>	II	Endangered
9. <u>Macromia splendens</u>	II	Endangered
10. <u>Leucorrhinia albifrons</u>	II	Endangered
11. <u>Leucorrhinia caudalis</u>	II	Endangered
12. <u>Brachythemis fuscopalliata</u>	II	Endangered
Orthoptera		
13. <u>Baetica ustulata</u>	II	Vulnerable
14. <u>Saga pedo</u>	II	Endangered
Coleoptera		
15. <u>Calosoma sycophanta</u>	II	Vulnerable
* 16. <u>Carabus intricatus</u>	II	Vulnerable
17. <u>Carabus olympiae</u>	II	Endangered
18. <u>Dytiscus latissimus</u>	II	Endangered
19. <u>Graphoderus bilineatus</u>	II	Endangered
20. <u>Osmoderma eremita</u>	II	Endangered
21. <u>Buprestis splendens</u>	II	Endangered
22. <u>Cucujus cinnaberinus</u>	II	Endangered
23. <u>Cerambyx cerdo</u>	II	Endangered
* 24. <u>Morimus funereus</u>	II	Endangered
25. <u>Rosalia alpina</u>	II	Endangered
Lepidoptera		
26. <u>Papilio hospiton</u>	II	Endangered
27. <u>Lycaena dispar</u>	II	Endangered
28. <u>Maculinea teleius</u>	II	Endangered
29. <u>Maculinea nausithous</u>	II	Endangered
30. <u>Maculinea rebeli</u>	II	Vulnerable
31. <u>Coenonympha oedippus</u>	II	Endangered
32. <u>Erebia christi</u>	II	Vulnerable
33. <u>Hypodryas maturna</u>	II	Endangered
34. <u>Eriogaster catax</u>	II	Endangered
35. <u>Phyllodesma ilicifolia</u>	II	Vulnerable
36. <u>Graellsia isabellae</u>	III	Vulnerable
37. <u>Hyles hippophaes</u>	II	Vulnerable
38. <u>Proserpinus proserpina</u>	II	Vulnerable

Hymenoptera

39. <u>Formica rufa</u>	III	Vulnerable
40. <u>Formica aquilonia</u>	III	Vulnerable
41. <u>Formica lugubris</u>	III	Vulnerable
42. <u>Formica polyctena</u>	III	Vulnerable
43. <u>Formica pratensis</u>	III	Vulnerable

+ Formica truncorum

Arachnida

Araneae

44. <u>Macrothele calpeiana</u>	II	Vulnerable
45. <u>Dolomedes plantarius</u>	II	Vulnerable

Crustacea

Astacidae

46. <u>Astacus astacus</u>	III	Vulnerable
47. <u>Austropotamobius pallipes</u>	III	Vulnerable

Mollusca

Gastropoda

Basommatophora

48. <u>Myxas glutinosa</u>	II	Vulnerable
49. <u>Segmentina nitida</u>	II	Vulnerable

Stylommatophora

50. <u>Catinella arenaria</u>	II	Vulnerable
51. <u>Oxyloma sarsi</u>	II	Vulnerable
52. <u>Vertigo angustior</u>	II	Vulnerable
53. <u>Vertigo genesii</u>	II	Vulnerable
54. <u>Vertigo geyeri</u>	II	Vulnerable
55. <u>Vertigo moulinsiana</u>	II	Endangered
56. <u>Geomalacus maculosus</u>	II	Vulnerable
* 57. <u>Balea perversa</u>	II	Vulnerable
59. <u>Helix pomatia</u>	III	Vulnerable
58. <u>Elona quimperiana</u>	II	Vulnerable
60. Madeiran land snails (16 spp.)	II	Vulnerable

Bivalvia

Unionoida

76. <u>Margaritifera margaritifera</u>	III	Vulnerable
77. <u>Margaritifera auricularia</u>	II	Vulnerable

Annelida

Hirudinea

Arhynchobdellae

78. <u>Hirudo medicinalis</u>	III	Vulnerable
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* Not proposed, Dec. 87

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